

Memoirs Of John Gordon Lewis

23 February 1925 - 8 January 2022



MEMOIRS OF JOHN GORDON LEWIS 1925 – 2022

From a basic beginning in the bush near Cowaramup during the world's Great Depression, John became a brilliant civil engineer. With an enquiring mind, he also had a thirst for knowledge of history, antiquities and architecture - and a love of nature.

He tried to leave things better than the way in which he found them.

3 Children	7 Grandchildren	1 Grand Daughter
Susan	Joel Tom	Stellar
Geoffrey	Tim Ben Millie	
Donald	Georgia Jackson	



Dad's memoirs primarily focus on his early years as a young boy through to the age of 40, which were his most exciting and intellectually creative years.

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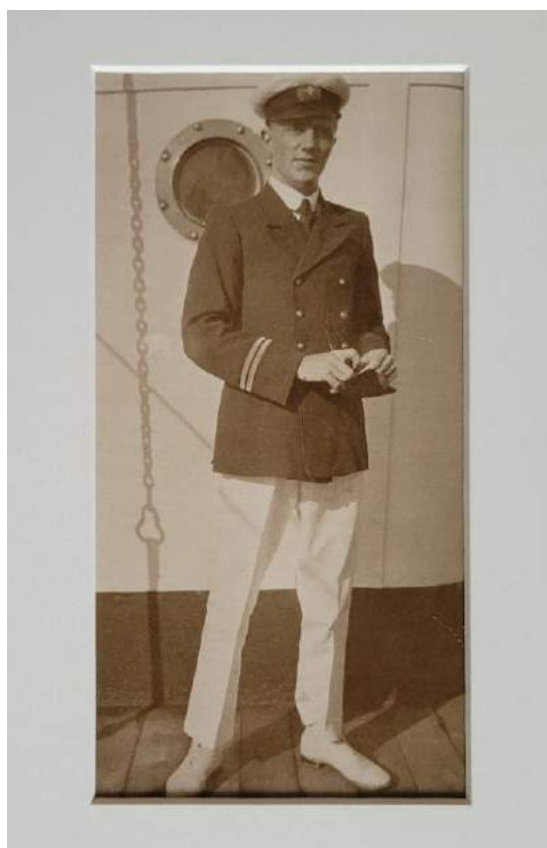
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Born London, England 23 February 1925

My Parents

I was born on 23 February 1925 at St Thomas Hospital in London. I was christened as St. Martins-in-the-Fields on Trafalgar Square. The family then lived for two years in Surbiton, on the Thames west of London where they ran a private hotel "Becleuch" without much success.

My mother had been a nursing sister and my father a first mate on ships plying between Durban in South Africa and Calicut in India. He had previously worked on sailing ships (windjammers) and sailed around Cape Horn three times, once bare masted. He was born on 3 August 1900 in Reading and left school at 14 when WW1 started to join the merchant navy as a cadet, which schooled young men as well as teaching them to sail.



My mother was born on 23 September 1891 in Rosscarbery, Co. Cork, Ireland. She grew up on a substantial gentlemen's estate "Burgatia" owned by her father John Deane. The Family were English Protestants living in Ireland since Cromwell's times. During the "troubles with the Sinn Fein, the house was burnt down in 1922 and the family threatened with being shot, so they left for England, where they received another farm as compensation from the British Government. The Home Farm, Whittlebury, Northants.

In the meantime, my mother had gone to South Africa in 1919 with her friend Rita Jago to follow her nursing career. I never knew she had had TB as a girl of 17 in 1909 and spent some time in a clinic in Switzerland as a cure. This seemed to have worked. My mother never had brothers and sisters because her father died of TB as age 36 in 1894. Her mother Annie married Tom Kingston in 1902 and they had a son Fuller Kingston in 1905 who later became a great friend and help to me as a young man while I was studying in the UK. My parents were married in Durban in December 1922.

During the First World War, my mother was a nursing sister at the Royal Victoria Military Hospital in Southampton, taking care of injured soldiers who had been shipped back from the trenches in France.

Out to Australia

The family set out for Australia on the SS Oronsay arriving in February 1927 with me just two years old and my sister Ann three months old. After the losses on the hotel at Surbiton and two other earlier failed ventures, they were refused any more money from my mother's family, who did not approve of my father's upper working class background. Therefore, Australia was in many ways the last resort.



My parents were promised land in the South West of Western Australia under the Group Settlement Scheme. They were never going to own much land in the UK and it was the beginning of the Great Depression too. This scheme promised English families around 160 acres of land, which the new settlers were to own by clearing it and turning it into viable farms. In retrospect, the scheme had many flaws.

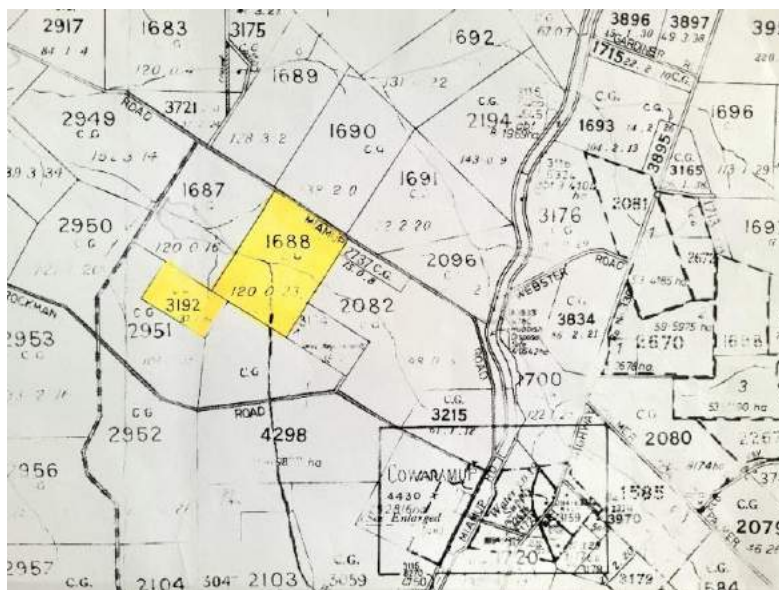
These people had never been on a farm before and had no experience in clearing, growing crops or looking after animals. My father knew something about handling ropes and pulleys used for tree clearing from his days "under sail" but the only power available was two draught horses. My mother did know a little about animals from her medical background and proved to be a very good gardener, as well as being capable and resourceful generally.

Within a few days of arriving in Australia my family took us to the Zoo in South Perth for an outing. On the way out, I must have followed some people on to the local tram and did not get off until it reached the terminus. Even at two years old, I could not speak so the tram crew did not know what to do. My mother rang all the hospitals with no result and eventually found. I had been sent to a child welfare centre where they picked me up. I was playing in a sandpit!

Aged 2-10 Cowaramup – Settlement Scheme

The Farm at Miamup Road, Cowaramup

Eventually my parents were placed on a recently abandoned farm at lot 1688 Miamup Road that at least had a house on it and a few acres cleared. It was situated only 2 kilometres west of the small village of Cowaramup on a gravel road. This is where my sister and I grew up until February 1935 when we left this area and the farm. My sister was eight and I was ten by that time. The house was called “Umtali” (Zimbabwean local word) and a South African name of a ship. These are the great years in a child’s life and much of it is still fresh in our minds.



After a couple of years, Dad had cleared enough of their land to plant some crops. These crops were mostly destined to become hay to feed our cattle and horses in the dry summer months. Our income was to be mostly by selling cream from the cow’s milk for making butter. Therefore, we had to milk as many cows as we could handle and separate the milk into cream and skim milk. The cream was then sent off by train to the butter factory in Capel twice a week and the skim milk fed to the pigs, which were another useful source of income. Steers and most of the pigs were sold to the butcher for meat.

We also ran a lot of chicken and sold both chicken and eggs. Sometimes we hatched our own chicks in an incubator, other times we bought them in. They had to be locked up at night because of foxes. As a child, I delighted in having young animals to look after. It was our job to feed the pigs and chickens as well as help milking the cows twice a day, as we got older. We had 40 cows eventually - and no milking machine back then!

We had every kind of fruit tree that was suitable for the area. Oranges, lemons, plums, nectarines, almonds, grapes, blackberries, apples, pears. Our means of transport was a light two-wheeled sulky in to town and a heavy dray around the farm. We also had a big horse drawn trailer with high sides on it for bringing in the hay, carting fertiliser, fence posts, wire etc.

My mother also had many Irish superstitions such as Friday being unlucky, as well as the number 13. If you saw a new moon through glass that was very bad for the next month. It was a good idea to turn a silver coin (mostly threepenny piece) in your hand and make a wish to compensate. Breaking a mirror was very bad news. Seeing a robin redbreast meant a letter was coming. There was to be no wattle or lilies in the house nor shoes on the table.

COWARAMUP 1927 - 1935



Clearing the Farm

When the land was being cleared, it was very exciting. The idea was to leave the biggest tree in the middle of any particular area and drag all the smaller trees in towards it using ropes, pulley blocks, and tree pullers. The fallen trees were then cut up using cross cut saws and the horses would pull these logs in to a big pile for burning. Logs too big to pull were rolled repeatedly using cant hooks. Then these piles of trees were burnt which would go on for days and days being most beautiful at night. Every so often, the horses would pull the heaps together so they would not go out. All of this was done when the trees were still green.

There were no tractors in those days so the big trees in the centre of each area had to be left. Another method used was ringbarking to kill the trees quickly so a crop could be grown. However if ringbarked trees were left too long they became dangerous with limbs dropping occasionally.

We had a modest creek (headwaters of the Willyabrup Brook) running through our property. This creek had a number of very large karri trees growing along it. These were too big for us to handle so we left them.

There were beautiful loamy soils along these creeks so we could grow special things there such as potatoes, onions, maize, peas, and oats. The horses would deep plough the land using a single share plough and stop when they hit a root or stone. As kids, we would help cutting and planting potatoes and planting onion seedlings. We had among many pets, a magpie that would pull the seedlings out as fast as you planted them, warbling away all the time with delight. Dad was one of the first to wash potatoes and he got a premium for it.



The House

Our house was originally a four room Group Settlement House made out of timber with two brick fireplaces with galvanised iron chimneys and weatherboard sheeting. It had a back veranda with a bathroom and wood heater. Clothes were washed in a copper with concrete troughs and a scrubbing board. My mother was a good bush carpenter making furniture out of kerosene boxes.

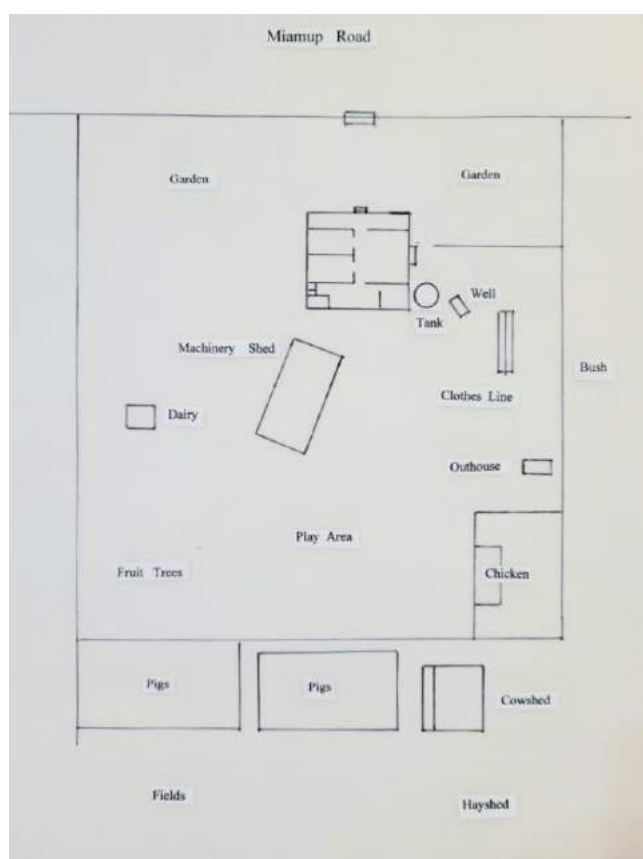
The front veranda served as a sleep out for my sister and me. It had a canvas weather awning. We had a pet kangaroo that liked to sleep there too and the magpie that would peck your toes for wakeup time. The kangaroo liked to sit on a mat in front of the fire in winter. The kangaroo was found as a "joey". It fell out of its mothers pouch when she was jumping a fence with dogs chasing her. It used to like eating used tea leaves in bran and paspalum seeds most of all. We had the kangaroo for 5 years but eventually it went back to the wild ones.

There was no electricity so we used kerosene lamps. There was no water supply so we used rainwater tanks and a nearby well with a windlass on it and a hand pump. Some people had small windmills. There was no septic system so the toilet was a "dinkum dunny" 40m away.

Homestead and Buildings

Around the house on about one acre of the whole 160 acre farm were various buildings – cowshed, chicken shelter, pigsties, dairy, machinery shed, and hayshed. Foxes would steal chicken at night so they had to be protected by a high fence.

The sketch below shows roughly where these buildings were but not a trace of them is left. This was perhaps one of the better laid out farms in the area. The buildings were mostly built of timber and corrugated galvanised iron while the pigsties and cowsheds had split jarrah walls covered with whitewashed hessian bags to keep weather out.



Garden

My mother used to keep a very good garden for fruit, vegetables and flowers such as rambling roses, hollyhocks, larkspurs, gladioli, lupins, stocks, etc. The photo below was taken at the front of the cottage. There were wattle trees too although the indigenous Blackwattles grew too big.



Ann's accidents

While on the farm my sister managed to break a leg when a strainer post fell off a cart. She was run over by one of the rare cars in Cowaramup coming up a steep slope without much visibility. Miraculously she was not injured. The car was driven by a Main Roads Engineer Sandy Blight who was eternally grateful that she was not injured.

Group Settlement Scheme Generally

This was run by the State Agricultural Bank, later the Rural and Industries Bank and now Bankwest. The bank would lend farmers money to clear the land, build all the necessary sheds, and fencing, acquire plant etc. to get going. They also paid a wage of 50 shillings a week while this was going on.

The intent was that the farmers would finally repay all the money lent to them and they would receive freehold title. This happened very rarely because the holdings of 160 acres proved to be too small and the fertility of the soil was poor before the discovery of trace elements some 30 years later. The Bank was always trying to get its money back and sent inspectors out to see what was going on because many farmers were getting an income that could not readily be policed. The basic income from sales of cream was quite apparent but that from pigs, chickens, potatoes, onions, etc. was harder to establish. The Bank even tried to cut off the farmer's income at the butter factories but they would not cooperate. When the inspector (John Vickery) came, the children would be sent away, Dad would have gone missing, and Mother got him a cup of tea. The Bank had no option but to leave the farmers on the land.

Even though it was the heart of the depression, we were never hungry or cold and really enjoyed the life as kids. In the end, however it was not really viable and we were never going to get that freehold title, so the family packed up, sold its stock, and walked off as most of the farmers nearby had done before. There was also the question of us going to a proper school fairly soon.

Cowaramup Bay

The chicken needed shell grit for their eggs, so every so often we would take a horse and sulky down to Cowaramup Bay (now Gracetown). We could gather shell grit on the beach there as well as having a picnic and a swim. There was a perennial spring now dried up. No one ever had a boat then. The massive rocks at Cowaramup Bay were favourite spots for fishermen but every odd winter someone would be swept off by a “king” wave. More successful ones would often bring a large groper in the back of his cart past our place and cut off a piece to sell to us or trade something else. This bay was strikingly beautiful, as everyone now knows.

School

My sister and I never went to school in Cowaramup. We could have done so as one of the teachers (Gypsy Bradshaw) used to drive her sulky past our place. Our mother preferred to teach us herself using the Correspondence Scheme now known as Distance Education. In those days of no radio, it worked using a written assignment system. It worked very well provided my mother herself was fairly competent. My mother bought a second hand set of Arthur Mee's Children's Encyclopaedias for \$5. I used to read this for years. As a result of not attending school, we had very little contact with other children except at weekends. We had limited play equipment. Some, I remember were swings, scooter, pram wheel to bowl along, old car tyre the same, football, cricket gear, marbles, draughts, cards, ludo and chequers. The only music we had was a windup gramophone (HMV) with a bell shaped amplifier. The first small disc I ever had was “Ave Maria”.



Radio

There was no radio and no telephone at first. Around 1934, a few people made their own crystal sets using a small crystal, a coil wound around a cardboard salt container, a condenser, and an earphone. There was no amplifier but you could hear it all right. Soon after came a radio with valves and homemade batteries made out of half beer bottles filled with acid and electrodes. This technology came from a neighbour called Cock, a skilled musician but no farmer, and a book called "The Outline of Wireless". The bottles were split by igniting a string around them soaked in kerosene and plunging in to cold water. For this to work you needed the biggest possible aerial. My father used twin karri saplings snigged out of the bush, spliced and bolted together, and pulled up against the house at one end and hung in to a large gum tree at the far end. (10m high by 25m long). This worked well and let us hear the Test Cricket Series of 1934 in England when Bradman was in his prime. A horse was used to raise the aerial against the house and nearly pulled it right over the top of the house.

Firefighting

We had plenty of hands on experience fighting bushfires with wet bags and branches. We got to know about back burning, firebreaks, and keeping out of the way when the wind changed. You would see forest fires coming for days so you could get prepared and hope it didn't come your way. My sister and I used to guard the haystack and put out any sparks before they took hold.

In the bush around the farm, there were plenty of snakes especially with fires about so we grew up without much fear of them. We also had a dog, which helped to keep the snakes away from the house and surrounds.

Pigs

In a storm, a dead tree fell on one of our pigsties and happened to fall on a pet sow almost killing her outright. My mother had to kill the sow by cutting its throat with a kitchen knife. This was very sad for us all. We cut up the carcass and gave away a lot to many of our neighbours. We salted the part we kept.

While thinking of pigs, we used to enter them in the local show and often won prizes. On one occasion after the show, we had no transport available and my sister and I had to drive two very large pigs about 2 kilometres from the showground to our home. They did not like this very much and needed a lot of careful prodding to get them out of any waterholes along the way.

Sunday School

My parents were careful to see that we had a good Christian upbringing so we went to the Sunday School in town every week. This Anglican Church in Cowaramup is still standing and in good repair. We had an attendance book in which we got a blue stamp every week and a red stamp every seventh week. We used to get dressed in shoes and socks. The horse and sulky would be hitched to a rail by my parents until the school was over. There is a photo of this church included.

Bush Nurse

My mother being a trained nursing sister had a set of basic medical gear including scalpels and stitching equipment, so she acted as bush nurse. The nearest doctor was at Margaret River some 15 kilometres away. There was of course no telephone on the farms. She had no anaesthetic apart from brandy so lancing boils etc. were tough operations. She also acted as midwife on some occasions.

Monument

There is a small road called Webster Road running west off the Vasse Highway about 2 kilometres north of Cowaramup. There is a bronze plaque there commemorating the early settlers of which my parents were one. This particular Group was 'Group 13' referred to as "the devil's own".



Wildflowers

The area around us was endowed with beautiful wildflowers including Kangaroo Paws, Boronia, and Orchids of all kinds. We developed a good eye for spotting them. We used to put small flowers in potatoes and send them to our relatives in England. They used to send us knitted jumpers and other clothes.

Rabbits

Around 1930, rabbits came to the South West from the Eastern States despite the Nullarbor Plan and several rabbit proof fences from coast to coast north/south. We used to trap them with special rabbit traps laid carefully at the entry to their burrows. The rabbits were very good to eat as my mother cooked them.

Sleeper Cutters

When clearing the land, sleeper cutters used to come through and would select fairly straight Jarrah trees to fell and cut into sleepers. They used to get one shilling for each sleeper provided it was top quality. The sleepers were collected by the Government and stored at each railway siding ready for shipping to Europe or South Africa. A number of timber jetties had been built for sailing ships on this trade i.e. Flinders Bay, Hamelin Bay, and Busselton. The farmers got a fee per sleeper apart from assisting in clearing their land. These sleeper cutters lived in tents and kept their axes, saws, and adzes razor sharp for easier work. They could shave with a broad axe. This led to competitions for log choppers at the local shows to cut through a log either horizontally or vertically in the quickest time. It just makes one tired to even think about it these days.

Busselton Jetty

At Busselton was the mile long timber jetty with a railway to take sleepers out to the ships. This jetty was and still is very popular for people to walk out and fish from it. Every so often, a fire used to burn a section away and it had to be replaced. The wooden piles get attacked by marine borers such as teredo and limnoria. Copper sheeting and charring was sometimes used to reduce the rate of deterioration. Steel piles will last longer but this option was not available originally. Much of the jetty has now been replaced.

Food and Meals

We naturally have fond memories of the various foods my mother used to provide. Breakfast in the winter usually was rolled oats and in the summer cereal such as “weeties”. We sometimes had a cooked breakfast such as scrambled eggs, bacon or potatoes from the night before - now called “hash browns”. Toast was available cooked on top of the cast iron stove or coals with the oven doors open.

For lunch, we were often out in the fields so we had sandwiches, cheese, and fruit. In addition, we would have salad at home with lettuce and lots of olive oil and salt. This was instead of cod liver oil, which my mother was very keen on to keep away chest infections. To this day, I enjoy lettuce, olive oil, and salt.

For our evening meal, we would have a roast once a week at least and sometimes chicken, rabbit, lamb, or pork. We often had Irish stew and occasionally dumplings. Fish was good when we could get it. We did not have a fridge so we kept things cool in a Coolgardie safe, which was a container with water in the top and flannels over the side so water could evaporate and keep the inside cool. Butter we kept in a semiporous container for the same reason. Incidentally, my sister and I made our butter using mature cream, which we beat for up to 10 minutes with a paddle until it thickened and turned into butter. We could make cottage cheese from sour milk using a muslin bag.

I don't remember having pasta, pizza, and Indian or Chinese food. We always had plenty of vegetables and fruit from our garden including potatoes, onions, cabbage, cauliflower, beans, peas, carrots, apples, plums, oranges, and apricots in season. Rice was popular but had to be purchased, also sago, tapioca, and vermicelli.

I always liked sweets better than the main courses. My favourites were apple pie, blackberry and apple pie, bread and butter pudding, rhubarb and rice pudding and roly polly pudding. We used to make jam and marmalade. We got honey sometimes from a wild hive with some difficulty but mostly from a large drum in the local shop using a treacle valve. Once there was a dead mouse in the honey bin. The grocer said you could not contaminate honey!

Sometimes we could catch jilgies in the creek in wintertime, which we would boil up in a tin. We could catch parrots using an upturned box propped up on a stick at one end. When the parrots were inside busily eating wheat, you could pull the prop out. However, the parrots were far too tough to eat so parrot pie was a myth for us. We never ate kangaroos but some people did.

We never had sheep because they used to suffer with footrot in the wet climate at that time. Occasionally we would have a few goats, ducks, geese, and turkeys but some of our neighbours were keener on them than we were. We used to make ginger beer and hop beer every so often. You needed a living yeast plant in those days and now and again, a bottle would explode. We had plenty of eggs for boiling, scrambling, or poaching. Dad used to draw pictures on the eggshells on a Sunday.

Pets

I have mentioned the Kangaroo and the magpie earlier. The magpie used to steal bright things like coins and jewellery and take them up into the nearest tree. However, when he started to sing about his success, he would drop his loot and we could often find it. Some people could teach a magpie to talk but we never did that.

We also had a pet owl (Mopoke) for a bit. He liked worms and mice but he was asleep during the day. We also had a pet possum but there was the same problem. You could catch a possum with a stick about 4 feet long laid against a tree with a wire snare.

Aboriginals

Regarding Indigenous Aboriginal people, we never saw any on any of the farms near us. We never saw them in Cowaramup or Margaret River. Maybe they retreated to virgin bushlands as the clearing took place. Originally, they must have been about in numbers because the early surveyors used many Aboriginal names. Cowaramup was not one of them. This relates to a type of parrot.

Blacksmith

There was always a blacksmith in the town. He would make horseshoes and rims for cartwheels among other things. As kids, we used to like watching his forge and him hammering out bits of metal on his anvil and quenching things that had to be hardened. Many farmers had a small forge and bellows for jobs around the farm.

Xmas Time

We had to leave a hole in the canvas awnings to the front veranda so Santa Clause could get in and try not to wake up too early. We were also allowed a drink of port and lemon on Xmas Day. We always had a Xmas Tree. Sometimes we would invite someone who had nowhere to go for Christmas dinner.

Other Activities

We would enter produce such as clover, oats, and maize in the local Agricultural Show and sometimes we won. As kids, we used to put in examples of hand writing and drawing - often beating the other kids from the local school.

There were competitions for our father such as "stepping the chain" i.e. pacing out and marking what you believed to be one chain (100 links, or 66 feet or 22 yards). The nearest to the right distance would win.

Then there was ploughing the straightest single furrow with a horse and single share plough. There was also "tossing the sheaf" of hay with a pitchfork over a bar which would be raised progressively. There were log chops for those good with an axe.

We used to make cricket balls from the very hard root of the blackboy trees – now grass trees. There were lots of zamia palms which were poisonous to cattle so we used to kill them by spiking with a crowbar and putting half a jam tin full of kerosene in the hole.

Our two draught horses were Judy and Bess. We used to ride them bareback because we had no saddles. We would take them as far from the haystack as we could and let them race back for a feed. Sometimes they were not easy to catch in the morning but they enjoyed working. We steered them by pulling on their ears.

What Happened to the Farm?

It was many years before I visited the Cowaramup area again. Our old farm had been amalgamated with the block immediately to the west and run by a family called Dempster (Bill). Our house was removed and combined with their house.

With the discovery about adding trace elements to the soil, many of these farms became more viable. Originally, the more gravelly soils on the hilltops were not worth cropping but with trace elements and deep ploughing, you could crop almost 100% of our old farm and the ones around it. Nevertheless, the return from the dairy farming (even with mechanised milking) was not that good as the twentieth century progressed. There was a move to beef cattle, which was not as labour intensive. Then there was a big move to planting and harvesting blue gums to make woodchips for export and papermaking. Everyone wanted to get on that bandwagon and our old farm was planted wall to wall with blue gums. They seemed to grow fairly well, but the only ones making any money from the scheme were the accountants and stockbrokers.

Next thing all the blue gums were ripped out before they had reached their first harvest and the whole area planted in vines for winemaking, which is what you now see all over Miamup Road. Originally, we used to grow a few table grapes on the old property and were possibly the first ones to do so in the area – Long before the Cullens, Cullities, and John Gladstone.

As I get older and complete my memoirs, I still like to go back every so often, and see the old farm, which has gone through such transitions over 90 years. It is now successfully growing vines for a nearby winery (Howard Park/Madfish) which is of excellent quality.

I have a desire to leave some contact for the family especially since Susan and Lindsay have moved down to Dunsborough not too far away. It may be possible to purchase say 5,000m², where the original house was, and build a modest house on it, with reticulated garden and fruit trees around it.

As the years go by such a retreat could be of value to the family and the grandchildren and a memory to all the hard work put in by my parents clearing the land and getting the original farm going. It could be a monument to them.

Age 10 – 12 Quairading 1935 -1936

In February 1935, the family left the farm the farm at Cowaramup after 8 years when I was 10 years old. We left in a truck with most of our belongings. We had sold most of the animals and a neighbour was going to take over the farm.

We stayed at East Fremantle (Glyde St.) for around two months where I went to school for the first time. This was a bit of a cultural shock, but not unpleasant. We got to know about shops, electricity, cars, trams, and living near the river. We met Miss McNamara at the Correspondence College.

Dad was looking for something to do other than farming. He eventually found an accounting business in the small wheat belt town of Quairading 65kilometre's east of York.

My parents must have made or saved some money from the farm because they had to pay for the business and rent the office and a house in town.

School at Quairading

There was a two-room school with a large fireplace in each room. The schoolroom was quite well equipped and I enjoyed my time there. The teachers reckoned I would be about Standard 3 due to the correspondence teaching but they soon advanced me a year so I was in step with everyone else. In a 2-teacher school you can hear what the other classes were being taught which was very beneficial for me. By the second year, the teacher suggested to my family they should move to the City if at all possible so that I could try to get a scholarship to Perth Modern School.

The teachers used the cane quite a bit not just for keeping order but also as a teaching method to learn from mistakes. I remember one evening two of us got in to the school and stole the whole stock of canes and burnt them. They never found out who was responsible but it was some time before they got their stocks replaced.

Life in Quairading

Life in Quairading was fairly good for children. We still did not wear shoes if we could help it. We had a pet cat and visits from the odd snake (one in our outdoor toilet) which we would kill if we could, but we were never bitten.

We used to gather mushrooms in season and fetch a billy full of milk from a nearby farm each day. Plovers used to nest on the ground and would attack us in the breeding season by low flying and dive bombing. Magpies would do this too, so you needed a hat and a stick.

There were pictures (cinema) in the local hall every Friday night. A few of us would patrol the streets with the school bell to advise residents what was on. For this, we got free entry to sit on the floor in front of the seats. On Saturday in the winter, there was usually a football game. The local association comprised Kellerberrin, Cunderdin, Tammin, Meckering, and Quairading. The ground was pretty hard until the grass grew a bit. The wind and rain were very cold at times and I used to get stomach cramps occasionally from sitting still.

In summer, a couple of us were good at cricket and if the men's team was short, we would be able to get a game with transport to the relevant town. At the school, we never seemed to have wickets so we used old kerosene tins on top of each other. Swimming was a problem because there were no pools, lakes, or rivers so we used to try to swim in farmers dams, which was very treacherous due to the slippery muddy sides.

The local water supply at that time came from an artificial storage on a big granite rock called Toapin. It was around 10kilometre's north of the town and water had to be pumped in to a tank on a hill in town. This involved a diesel engine and a large windmill for when there was enough wind.

My father's accounting business extended to being the agent for engines and windmills so I got to know how a water supply worked when quite young. Incidentally, my father was also agent for buying wheat, wool and sheep as well as selling fertiliser. He used to get a commission and had the daily prices on a blackboard outside his office. He used to also be secretary of the local hospital, power supply, and water supply. There was one other accountant/agency in town but Dad built up a reasonable business. He also did farmers tax returns, which he must have taught himself to do.

A thing of great excitement was the arrival of the circus at least once a year. They would come by train with all their animals and equipment. A fair bit of shunting of trucks had to be done and this was mostly by elephants, which we found to be very exciting. We used to all hope for a lion or tiger to escape but this never happened. Despite its interest, I don't remember any of the kids saying they wanted to join the circus when they grew up. I think they were all too scared.

Scouts, Guides, Churches.

Another activity that was popular was boy scouts and girl guides. I don't recall any problem of any kind and it was very instructive to all children who mostly joined the clubs.

All the churches were represented in Quairading. We both continued to go to Sunday School but it became apparent that not everyone did. The Methodist Minister was the best so we went there. We had no car, pushbikes, or horses so we walked everywhere, which was not much problem in a small town at that time. The rail service was quite good.

There were two girls in the school that I found quite attractive but they would not talk to me. One was Irene Blackwell and the other Jean Whitford. Irene was blonde with glasses and Jean a bit older and of dark complexion. They were both bank managers' daughters.

Mothers Health

Unfortunately, at this time my mother's health started to deteriorate. She would have been around 44 years old. She used to say she had a heart strain or pleurisy but it seems in hindsight that the TB was returning, but it was not so diagnosed. (She was to live eventually to 67).

She had been and was a very robust woman but it seems the lifestyle in a small country town did not suit her very much. She very rarely entertained anyone, did not have many real friends, and not many hobbies apart from family and the garden, which was not as good as at Cowaramup because there was not as much water. She never played tennis, bowls, or golf, which were available. She used to write to her family in England quite a bit and look forward to the mail. I don't recall her knitting or painting but she always had a sewing machine and was a good dressmaker. She would read quite a lot, especially the bible.

On one occasion, a small biplane came from Perth and landed in a paddock near the town where it was doing joyrides. However a willy-willy came along and threw the plane on to its wing which being covered with a heavy canvas type material, got torn. This was very serious but my mother came to the rescue with a bagging needle and heavy string (twine) and sewed it up. With that, the plane flew back to Perth.

Some of the names I remember are; Hinkley, Etteridge, Gerard, Keevil, Harvey, Dall, Keast, Cockle, Genoni, Parker, Clements, Fraser, Wass.

Violent dust/thunderstorms used to come through apparently more often than now and fill the house with dust. On one occasion, lightning struck the roof and burnt its way down a steel bedpost. Balls of lightening were known.

QUARADING 1935 - 1937



Aged 12 – 16 27 Richmond Street, North Perth 1937 -1941

North Perth Corner Store

In around February 1937 the family sold the accounting business in Quairading and moved to a corner shop at 27 Richmond St. North Perth. This was typical of corner shops at that time and quite a good business. It was 7 days a week and long hours and we all helped out.

We used to sell groceries, vegetables, cold goods, fruit, and newspapers. I used to deliver orders in a cane basket to our good customers who each had an order book under their name. They would pay at the end of the week if they could. The price was marked on most things but you also had price lists to refer to. By this time, I was quite quick at numbers and additions since there were no calculators. We wrote out what people had taken in their book and got them to sign.

We used to cut cold meats in a circular cutting machine (slicer) in various thicknesses. Cheeses, polony, and ham - all were sliced up. We had good scales for working out the price of what we cut. Heavy things like potatoes were measured with a balance and weights. In the second year, I had a pushbike so it was easier to carry things. I used to get a roll of newspapers from Leederville or downtown in William Street twice a week. We also used to weigh out 70lb bags of sugar into 1 and 2lb paper bags.

Dad used to keep vegetables and fruit under a large fig tree covered with wet bags to keep them cool. It was a battle with snails and slugs at times. We used to get our supplies twice a week from a Chinese grower (Ginge) who had a horse and large four-wheeled cart to do the rounds in North Perth from his market garden in Smith's swamp (now filled in). He used to also get produce from the metropolitan markets in West Perth where Harbourn town is now. The horse knew the round exactly and where it had to start and stop.

Milk and bread was also delivered by horse and cart to our shop and also to houses in the area but this could mean leaving out money, which was not safe. There was a postal service, telephone, and electricity available. Everyone had a radio by then which was only 3 years after radio came to Cowaramup.

School at North Perth

The year of 1937 was the one when I went to North Perth primary school in Standard 6, which was the preparatory year for the scholarship exam for getting into Perth Modern School (PMS), the mecca for bright kids in WA. This was an enjoyable year partly because the teacher, Ernest Smith, was a very good teacher. Kids came from all over Perth to attend his class. He used to call me "the boy from the bush" and I would often be the only one to answer difficult questions in class.

I used to sit at a desk with Keith Brown who was among many who became doctors. About a dozen in this class of around 40 finally got a scholarship into PMS, which was a high proportion. Another of the successful students was Julie Heath who became my wife 15 years later. A lot of very bright kids did not get scholarships because it was a brief exam with maths on one morning and English another – just around 4 hours so you could be lucky or unlucky. There was no exam in history, geography, science or anything else, so the course was geared to English and Mathematics.

In those days there would be a spelling test every morning of about 20 words that you were supposed to learn overnight, but I had things to do at the shop, and in the morning I would be at cricket or football practice. Hence, I often got a couple of spellings wrong which resulted in two cuts of the cane to everyone's amusement. However Ernest Smith knew I was not likely to get any of the following maths test wrong so he would bet me "double or quits" on the outcome. I nearly always won that one but it was an interesting way of teaching bright students.

North Perth School was well run and a number of Rhodes Scholars have come through it as well as figures in engineering, science, history, and politics. We learnt not to be late with the usual penalty. There was a free handout of milk at morning teatime. We all took our lunch and a piece of fruit. We were supposed to wear shoes and socks but not everyone did. The girls would wear shoes. I never had a bike in that year so I would walk to and from school – about a kilometre each way.

Customers

In the years 1938, 1939, 1940 and part of 1941, I went to PMS and my parents gave me a bike because it was about 2kilometre's each way. I soon learned about mending punctures and not falling off. I had a wheel driven generator for the lights at night. No one would steal your bike around the shop or school in those days.

Around where we lived in the shop there were two politicians who became Ministers and I used to deliver groceries to them, (Alex Panton, Herbie Graham) Alex Panton gave me a nice reference when I got my first job. I still have it. Some of the other customers names I remember are Birchall, Spencer, Rigby, Davies, Bell, Wilson, Etherington, Buttsworth, Harman, Richardson, Hope, Head, Dark, Butcher, and Walkerden.

Jack Peard

In these years, a friend of a relative of ours from Ireland was sent out to us to look after. His name was Jack Peard. He was an incorrigible gambler, which is why he was sent out. He could never keep any money. He was very likeable but not used to work and you couldn't get him to do anything continuously. Eventually when the War came in 1939, he joined up and was sent to Greece and North Africa. He got a minor war infection and was invalided out with a modest pension. He eventually married a very good girl (Olga) who helped him enormously. They lived in a modest house in the bush as it was then, in North Beach and raised 5 children under fairly difficult conditions. One of those children (Peter) established a very successful real estate business bearing the Peard name.

Modern School

Modern School was a great pleasure to me having come from Correspondence in the real bush to the best school in the State. Nothing was too difficult and I was in the top several in my class of 27 students. I became captain of that class in football and cricket. I got on well with the teachers who really had a very easy job with that class of student and no stragglers. Nevertheless, there must have been a few who had a lucky day when the entrance exams were on. Some of the teachers I remember were; Anderson, Constantine, Staples, Parsons, Sharpe, Sampson, Stevens, Clarke, Hetherington, Adlard, Brown, Curran, Pollard, Haire, Parker.

The War

In 1939, the War began and we were digging air raid shelters around Perth as well as in schools and our homes. Every so often, we would have a trial exercise but we never had a real warning. There were flying boats operating out of the Swan River at Crawley Bay and submarines used to work out of Fremantle. We all followed the radio news very intently especially the western desert campaigns in North Africa.

However to the young people at school the war was still a long way away and it was not until the Japanese entered the war at the end of 1942 that everyone realised what might happen to Australia and that our safety depended on the US and not Britain.

1943 was our worst year and for the Americans although things were beginning to look up in Europe with Germany running out of supplies. How they managed to pursue the war so long was a miracle in itself.

Back to 1941, my father decided to sell the shop and join the forces in the Survey Corps. (Mapping and Intelligence). He was now 40 years old and quite fit. As the accommodation went with the shop, we moved briefly to North Cottesloe and then to 23 Emmerson Street, North Perth not far from where we had been.

Mother's Health

My mother's health had been deteriorating steadily. She was now diagnosed with TB and had been in and out of the sanatorium at Wooroloo several times for several months at a time. We had built a separate sleep out for her. All of her utensils and clothing were kept separate to reduce the risk of passing on the infection. We would go to visit her by bus and train Sunday after Sunday. Once she became infected again, she could no longer work in the shop and could not do much around the house. We used to employ a girl to help out in the shop and the house (Kath).

Corner Store House

In the corner storehouse, my sister and I slept on the front veranda facing the street. There was an enclosure up to dado height and canvas awning about that. There was a small patch of lawn and some flowers just outside. In the road verge, there was a fairly large NSW box tree (gum) which had been pruned to shape. The bathroom was on the back veranda as were the copper and concrete wash troughs.

We made use of the fridge in the shop where we also had a freezer. There were a couple of ceiling fans for cooling the rooms when needed. There was a fireplace in the lounge/dining room next to the shop. The street off Richmond St. was Morrison St. and there was a lane at the back of the block. There was an outdoors toilet at the back and it was connected to a sewerage system while we were there. There was also a timber and corrugated iron shed/garage on the back lane. Since we still did not have a car, this was used for general storage. We had a few fruit trees (fig, lemon, plum, apple, and nectarine) and used to grow a few vegetables, mainly potatoes and lettuce that we sold.

Age 16 – 26, 23 Emmerson Street, North Perth

Friends

The pushbike came in Christmas 1937 for getting to Perth Modern School 2 kilometres away via Loftus Street. We used to play football and cricket in Beatty Park not far away. One of my friends was Fred Buttsworth about two years younger than me. He was not a very good student but he was a born footballer/cricketer and finished up playing for the State in both. He had an elder brother Wally who also did that together with being good at athletics and swimming. Many students in those days finished up two years behind where they should have been which enabled them to be very competitive in Primary School. Wally was one such boy.



My First Job

When Dad joined the army in 1941, we moved to 23 Emmerson St., still in North Perth and closer to Beatty Park. It overlooked the Chinaman's gardens, which were very productive at that time but have since been filled in for housing development.

This was well into the war and I was 16 years old. I had been having a few problems with Noel Sampson, the headmaster at Modern School over not attending religious tuition on Friday mornings so I decided to leave school. I applied for a job at the Public Works Department, which was involved in many local defence works. I used a reference given to me by Alex Panton and was taken on as a messenger in the Engineering Drawing Office at 26 shillings a week which was a useful contribution to the family at that time when the basic wage was less than four pounds a week if you could get full time employment. In my spare time as a messenger, I used to learn the skills of engineering drafting and was soon producing useful work especially for harbour works around the State where there was a fear of being attacked by submarines and aircraft.

My first boss was Freddie Dent an English migrant in 1926. He was not a brilliant engineer but a good boss and helped me wherever he could. Among my immediate seniors were Bill Baines, Alan Aldred, Stan Newsome, Reddie Hall, and Bob Mac Beth. They all helped teach me what to do.

Drawings were done in pencil also using rubbers, scalpel and erasing shields. You would print as well as you could and then female tracers would trace the drawings on to transparent linen that could be copied in a "sun-printing" machine in to white prints or blue prints either on paper or on to linen. The man who did the sun-printing was named Smith whose spare time interest was economics on which he would hold forth to anyone who would listen (especially Douglas Credit). It was part of my job to transport tracings for printing and pick them up when they were done.

Another job I had to do was keep the attendance book up to date. This was a big lined book in which everyone except Freddie Dent signed in both in the morning and afternoon. I had a round ruler and red ink so I could draw a line across the book. More than five late occurrences in a month would draw a severe reprimand and possible fine from Freddie Dent so I could not afford to be late myself.

As a messenger, I used to have a heavy black Government pushbike to ride down town to pick up things from the Lands Department and elsewhere. On one of these trips, my bike was stolen and could not be found. I did not want to tell Freddie Dent and got all the other messengers in the civil service looking for it. I could use the tram but that cost money. Eventually the Police found the bike abandoned in James St. (Northbridge) undamaged. Apparently, it was too heavy for whoever stole it. When Freddie Dent retired, he told me he had always known I had temporarily lost the Government bike.

Night School

I found out that there were night school classes at the Perth Technical College for further education and mechanical, electrical, and structural engineering especially for workshop apprentices and draftsmen. Therefore, I decided to attend those classes on a couple of nights a week to start with. These were free and I used to ride my pushbike there and back in the evening.

Cadet Draftsman

Soon I found there were going to be advertisements for two cadet draftsmen so I applied for one of them, which I got and started in the same office in January 1943. From then on, I was employed mostly on harbour works at Fremantle, Bunbury, Albany, and Geraldton where temporary jetties were required mostly for smaller naval boats, and antisubmarine nets, which could be drawn across the entry to the harbours. I also became involved in the slipway at Arthur's Head in Fremantle for submarines and destroyers primarily. I learnt about piling, sheet piling, cranes and winching. I used to go down to Fremantle by train for weeks at a time.

I became involved in harbour maintenance, preparations for a floating dry-dock and dredging of the channels in to Cockburn Sound (Success and Parmelia Banks). I did the fair drawings for quite a large jetty off Rockingham (Fisher St) using the sizes and spacing's I was given. This has since been demolished which seems to be a great shame. Another jetty complex I drew up was for Fair mile vessels at the eastern end of Victoria Quay. By this time, my drafting was good enough to get work off more senior draftsmen. In 1943 I drew up a complete "as constructed" plan of the slipway at Arthur's Head. This was some 1.5m long on Whatman's paper. I still have it because only the tracing was needed for the records. This was an immaculate example of the draftsman's skill in pencil drawing. The slipway still exists as a museum piece with a submarine on it but it does not work anymore.

Cadet Engineer

After some time as a cadet draftsman, it became apparent that I could aspire to becoming a cadet engineer but that involved getting my Leaving Certificate good enough to qualify for getting in to UWA's Engineering Faculty. I went down to see the Dean Professor Blakey who said you would never make it because you need six subjects at a certain level, and even if you did, the Public Works blokes never do much good. On top of that, you need to play rugby not Australian Rules football.

I think that just made me more determined, so in 1944 as well as continuing my studies for a structural draftsman, I took on at night school English, Maths "A", Maths "B", Applied Maths, Physics and Drawing. The Maths was easy for me because I already had the equivalent of Maths I at University Level. Physics and drawing were always easy to someone whose future depended on it. English was another matter. However, I found that several Modern School teachers were teaching at night school and here they really have to teach and not flow along with extra bright students as at PMS. They also used to pick the papers for us at night school based on previous exams. In this way, I got 73 for English based on one-hour formal study a week for one year. All the rest of my marks were very high so I got over that hurdle of qualifying for UWA engineering, although I was now two years older than was the average college student.

With this part done, the PWD decided to transfer me from cadet draftsman to cadet engineer commencing at the start of 1945 (age 20). A condition was that I work for the Department in all University holidays but at the appropriate pay. During term time, I got a grant from the Federal Government of £2 a week, which meant all the difference between me becoming an engineer, or not.

Dredging and Dredges

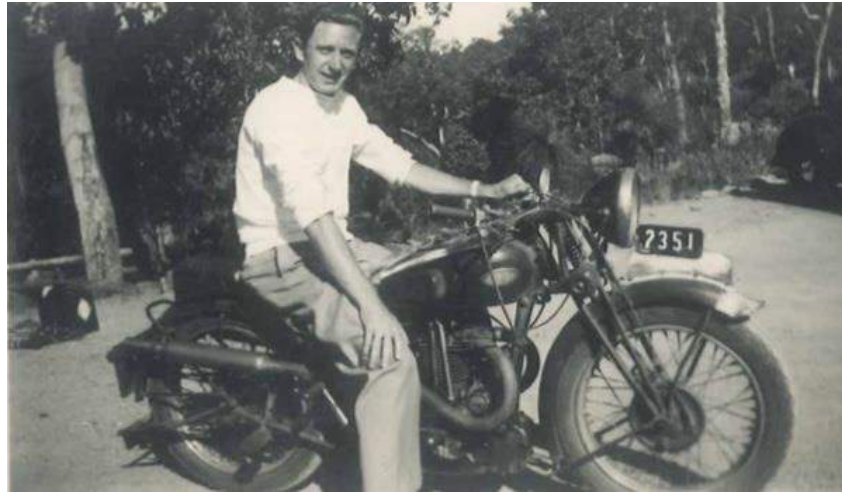
At one time during 1944, I was involved with upgrading the trailer suction dredge "Governor". It needed a change in layout of the pumps, extension of the "sponsons" which protect the trailer suction pipes when berthing, larger suction pipes, and larger suction head. I drew all these up which did not need too much mechanical design. However, I also had to enlarge the steam engines on deck. I had never done a steam engine before but I had passed my Mechanical Engineering Design 1 at Perth Technical College and had studied a book on "Steam and Other Engines" by Duncan. I had a set of drawings for the original smaller steam engines. Being wartime, you just got on and did things as best you could. My boss at Fremantle said 'I hope they work' and they did.

Everything was made at the State Engineering Works in North Fremantle where I watched the casting and machining on occasions. They did a great job and helped educate me. I learned a lot about trailer suction dredging during this exercise. It used to be fairly rough at times out on Success and Parmelia Banks and posed some risk to forward cutter dredges so they would have to stop whereas trailer suction dredges could continue.

Dredging could cost as little as one shilling per cubic yard back then.

Motor Bike

By this time, I also acquired a second hand motorbike – A 3.5hp BSA. I had a friend from night school called Jack France who was an apprentice at the Midland Junction Railway Workshops and he used to help me take the bike to pieces and put it back again with any repairs needed. During the war, petrol was very short and we only got one gallon/month, so if you had a farmer friend you could use power kerosene – but you needed a small bottle of petrol to start the bike each time.



Life at 23 Emerson Street 1941 to 1945

With Dad gone in the army, we would only see him on some weekends on leave because he used to stay in the Survey Corps Barracks at Karrakatta. My mother continued to have long periods in the Wooroloo Sanatorium and we would visit her by train on Sundays. When she was at home, she used to live in an annexe we built on to the back of the house to keep her separate. In the early years, she could prepare a meal for me or my sister to cook in the evening on return from work.

For quite a long time my sister used to board with a friend of hers called Betty Bell not far away. I had a small spare room I used as a study, but I slept on the front veranda, which quite suited me. I used to coach my friend Jack France far into the night in my spare room. We had a boarder Alice Sharpe from the PWD for quite a long time. She used to help out in the house and in the garden.

At one time when all the family were away, we leased the house to a family called Campbell in return for looking after me. They had worked at Reedy's goldmine before the war and two of them worked for the tramways. These were tough times for a young man and it was fortunate I was involved so much in work, night school, and sport.

During this period, the local clergyman invited me to stay at the manse adjoining the local St. Paul's Church in West Perth. This turned out to be a bit of a problem so I soon gave that up.

As soon as the war ended, my father was discharged so he returned home and for a long time my mother entered one of her better spells and my sister returned. The TB drug called streptomycin had emerged but most of my mother's lungs had gone by this time. My father got a job with the Lands and Surveys Department where he stayed until he retired some 20 years later. My sister got a job with the PWD as a tracer where she would often run into me.

My parents bought a small car and took the front seat out of it so my mother could get into it. Due to her illness, she had put on a fair bit of weight. Girl friends were never very welcome by my mother at our house so I only ever had the one called Betty who came from the local church. She worked in a solicitor's office but we were always arguing and she was quite bad tempered.

Life at 23 Emerson Street 1945 to 1951

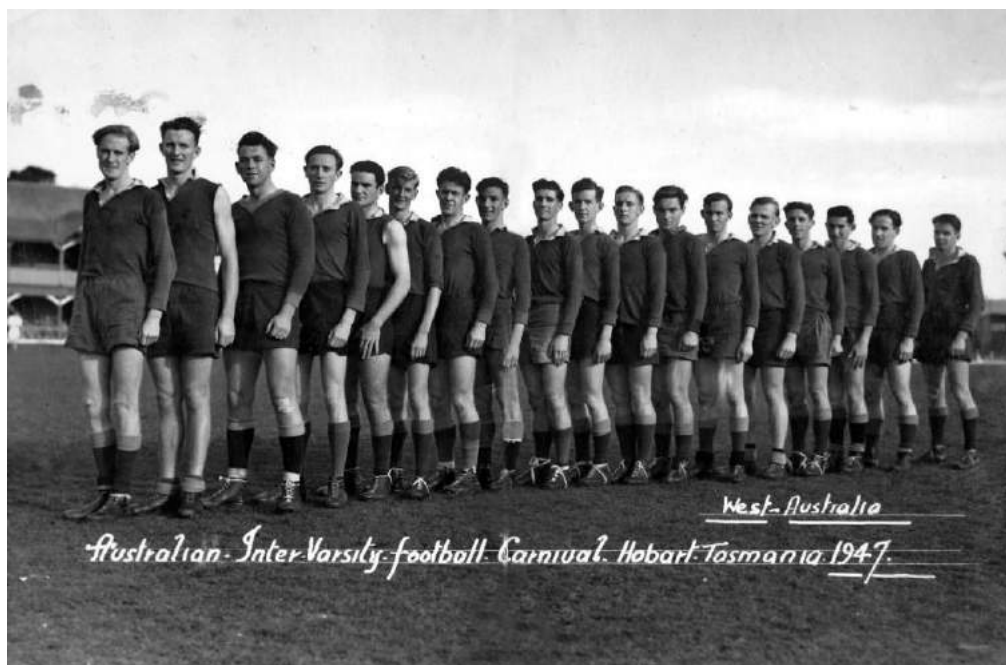
These were relatively good years except for my mother's health. She had various operations on her lungs and had parts of them removed. This combined with the new drug brought quite long periods of stability. This was a placid period in my life. I was 20 years old, now a cadet engineer entering University with my own motorbike, getting a modest income, and playing football and cricket whenever I could fit it in.

UWA

I was given most of the first year subjects as satisfied by exams I had already passed at the Technical College so I had only three years to go out of the four year course. The lectures were mostly in the old Shenton House. Lecturers were Baldwin Wiseman (Hydraulics), Frank Blakey (Structures), Frank Taplin (Electrical), George Hondros, Campbell Massey and Jim Espie. They were not great lecturers but sufficient for the purpose. Lectures in the main University were in Chemistry (Bayliss), Maths (Gamblin, Weatherburn), and Geology (Clarke, Prider) all of whom were excellent. The ambience, library, refectory, grounds etc. were a great asset towards study, but many students in Arts appeared to me to be wasting such a good opportunity.

1945 was a year in which many ex-servicemen were returning and keen to get qualified - as I was. The idea of student initiation did not sit well with any of us so we sorted that one out for a start. I was no longer tied to night school so I had more time for a normal social life and a bit of travelling with the motorbike and friends. (Albany, Geraldton, Wickpin, Busselton, Augusta, Cowaramup after 10 years). I started to read more than I had done and learned how to conduct research. There were many gravel roads in those days inevitably leading to a few spills but with only cuts and bruises despite not having helmets. At the University, I played both football and cricket in the top teams, which not many did or had done. I played league football for West Perth for a couple of years and Grade cricket for North Perth.

As a cadet draftsman and then a cadet engineer, I got to know most of the senior engineers. Stevenson Young, Normal Henry, Cyril Morgan, Jack Gillespie, Harold Hunt, Dave Bryden, Don Munro, Victor Munt, Cyril Dimond, Russell Dumas, Jim Jukes, Santo Crimp, AM Hutchinson, Geoffrey Drake-Brockman, Jim Shirley, Hugh Edwards, Frank Kenworthy, Wattie Davies, Ken Kelsall, Eddie Gorham, Bill Benson, Digby Leach, Jim Young, Don Aitken, Albert Tognolini, Bob Hillman, Ernie Godfrey, Gilbert Marsh, Ron Punch, Des Kelly.



Stirling Dam

One of my early jobs as a cadet engineer in 1945 summer vacation was to help revive construction of the Stirling Dam east of Harvey. This had been closed down during the war. I started with a foreman (Bill Darcy), 3 gangers, (Ernie Rowe, Bert Bridson, and Jock Robertson) and 25 men. We had to get an old steam dragline going in what was called a “pug” pit for getting white plastic clay for the core of the dam and other old steam machinery. The days of bulldozers and scrapers had not yet arrived but were coming.

Among my bosses was Victor Munt who had been to the US studying dams and he decided the “pug” core compacted by sheep and horses was no longer necessary anyway. Nor was the concrete cut off to rock basement under the dam. I could see his reasons but did not yet understand the science behind it.

Nevertheless, this was a rapid education for a young cadet engineer whose previous training had been in harbour works and related equipment. It was also here that I learned to drive a vehicle, being taught by Jock Robertson on gravel roads around the dam. It transpired about 20 years later that Jock had never had a driver's license in his whole life. He used to roll cigarettes while driving and steer with his knee.

Mundaring Weir

In the following University summer vacation, I was sent to Mundaring Weir where the concrete manufacturing plant was being assembled for the raising of the original weir constructed by CY O'Connor 50 years earlier. This involved two second hand crushers ex Canning Dam, new secondary crushers, bins for crushed stone, several conveyors, a cement silo and a concrete mixing plant. There was still limited equipment and most of our lifting was done with ‘gin poles’. In one case an old scotch derrick was erected for excavating decomposed rock foundations and placing concrete in the base of the dam where CY O'Connor had had a lot of trouble originally. The use of ‘gin poles’ with pulley blocks and ropes goes back to Egyptian and Roman engineering which I did not realise at the time. We lived in Nissan huts on the site and had our own mess and showers.

The workforce was around 100 men and every so often the Police would come and do a parade to see how many scoundrels we had. Mostly they would just tell us what they were wanted for and leave them with us so long as we advised of any seeking to leave.

A year later, I became involved in the design of the raising of the weir because not many engineers were interested in design at that time. The skill was to devise a system that would let the new concrete addition gradually shrink against the old wall and then seal the two parts together once that had happened. I wrote a Paper for the Institution of Engineers on this under Victor Munt's name but with due acknowledgements. An idea that Victor brought back was pumping concrete through 200 mm diameter steel pipelines. This was new to dams in Australia and took some time to perfect at Mundaring. It was less expensive than older methods such as cableways, or towers and chutes as used at Canning Dam in the mid 1930's. Concrete pumps had not been used on buildings either up to that time.



Hydraulic Engineer

My engineering degree was completed at the end of 1947. I then became a fulltime engineer and with my background decided to specialise in design. It was decided I would work in the Hydraulics Branch of the PWD under Victor Munt. It was a good relationship because he did not really understand design. He had many innovative ideas but did not know which would be the good ones. His father had been Under Secretary for Works and some felt Victor had a privileged position.

During the years 1948 to 1951, I worked on many small town water supplies bringing water to some 30 towns, which had never had a water supply before. In some cases the level of hygiene would not have been acceptable now and there was no environmental process to be followed. If a scheme looked like a good one and was not too expensive you just did it, often with a bit of political help. I well remember occasions when a Minister would walk past my desk in the Old Barracks to see how things were going and if a particular case "might be expedited". I would then have to report to my boss and the Under Secretary without placing any evidence on any files.

In relation to lack of hygiene, although we had a few scares with algae blooms and goldfish dying, we had no epidemics and people just needed to be careful. As time went by we gradually got a few chlorination systems going but they were not automatic.

Wellington, Harris Dams

In these years, a lot of time was taken on the raising of Wellington Dam. The hydraulics had to be established as well as design of the wall, which closely followed the example at Mundaring. As well as water supply to the south-eastern wheat belt, Wellington was to be used to extend the irrigation system on the coast. There was a known problem with increasing salinity on the catchment so we tried to limit that by restricting clearing on the catchment. This was politically very unpopular but some success was achieved.

The problem of supply of good water to the south-eastern wheat belt was solved by putting a smaller dam on the Harris River, a virgin tributary from the highest rainfall part of the catchment north of the town of Collie.

Gledden Fellowship

Sometime in 1950 at the age of 25, I had an idea to apply for a Gledden Fellowship from the University of WA. These were available to suitable candidates in engineering or science usually just one each year. My boss and the Director of Engineering (Russell Dumas) decided to support my application, which was successful for a two year period. Russell said to me I am also going to put you on half pay with no agreements other than we shake hands and you undertake to come back to PWD. This was pretty much unheard of at that time.

Age 26 – 29, Overseas Experience 1951 to 1953

Arrival in UK

I went to England on the Maloja in June 1951 leaving behind my fiancée Julie Heath while I saw how things worked out in the UK. The boat arrived at Tilbury Docks in east London and I clearly remember going in to Piccadilly by underground train so I could come up in the centre of London for the impact, which was very dramatic. I think I stayed at the Strand Palace Hotel while I got my bearings. In those days if you walked along the Strand you would often see someone you knew from WA (not now).

The first things for me to see were Westminster Abbey, St Paul's Cathedral, London Bridge, Oxford St., Hyde Park and Trafalgar Square opposite which is St. Martins-in-the-Fields where I was Christened.

Imperial College

I had decided to go to Imperial College and secured a place there doing soil mechanics and hydraulics. I found some digs in Willesden Green with the help of the University. This proved to be a convenient and comfortable arrangement. The place where I was to study was in South Kensington near the Albert Hall and the Natural History Museum. It was about 8 kilometres from my digs and I used to come in by 52 bus most days and sometimes by train and 73 bus.

Relatives

I established contact with my mother's relatives in Northamptonshire (Fuller and Gwen Kingston and 3 daughters - 14, 9 and 4 years old). Their place was called 'The Home Farm' near Towcester to which I had been writing letters for many years. It had a croquet green, tennis court and all the necessary farm buildings for a 400-acre property, which was a big farm in England.

I also contacted Julie's auntie Lily (Vaughan) and her more distant relatives in St. Albans north of London. Lily was a sophisticated spinster still working for the Prudential Insurance Company in the London head office. She lived in an apartment in Finchley Rd between Golders Green and Hampstead Heath. It was more or less walking distance to my digs and a rather pleasant shock for me.

Trip to US and Canada

Course work was due to commence in late September so I decided to take a long trip to the US and parts of Canada before settling down. In July/August, I went to visit many dams being built by the US Bureau of Reclamation and the US Army Corps of Engineers. I also went to their design headquarters.

The places I visited were;

Washington – Approvals, Museums, Galleries,

Tennessee Valley Authority – Pickwick Landing

Vicksburg – Corps of Engineers, Mississippi River Motel

Houston – Falcon Dam – Rio Grande River

Denver – US Bureau of Reclamation. Home of the Dinosaurs.

Boulder Dam (Hoover),

3 Dams in the Sierra Mountains, California – Oroville, Cachuma, Pine Flat

San Francisco – Berkeley Campus

McNary Dam – Columbia River

Grand Coulee Dam – Columbia River
Hungry Horse Dam – Montana
Canyon Ferry – Montana
Fort Peck Dam – Missouri
North West University – Chicago
Harvard, MIT – Boston
Toronto, Ottawa, Montreal – General interest.

Travelling was mostly done by Greyhound bus, which was very good then. You could sleep on the long runs on the bus, which saved a lot of time. You learned a lot about America by talking to the passengers. Nothing could have been more beneficial to a young engineer (now aged 26). It also confirmed that I was happy with Imperial College.

The big cities I visited were New York, Washington, Houston, Denver, Los Angeles, San Francisco, Chicago and Boston in the US and Toronto and Montreal in Canada. This was a long and exhausting trip on your own but of course very exciting.

Hydro Power Trip to Europe

In the term holidays, of March 1952 a group of about 20 from the College decided to go on a hydro power trip to Europe. This involved going to the following places;

Basel - Birsfelden Barrage on the Rhine
Zurich – College and Turbine manufacturers
Escher Weiss
Luzern
Meiringen Sion – Grande Dixence
Mauvoisin
Grenoble – Tignes Dam, Sogreah Hydraulic Testing Laboratory
Valence, Donzère/Mondragon – Rhone River Low Head Plant.

This taught me a lot about turbines, tunnels, and low head river plants.

Unfortunately, there were not many hydro opportunities in Australia after the Snowy finished.

Getting Married

In around May 1952 Julie arrived at Southampton, moved in with her auntie Lily, and started teaching at various schools around London. We were married on 17th of September 1952 in a small church in north London. With all our relatives, we had about 30 people at the church and at Lily's apartment afterwards. My best man was Don Macdonald a Canadian from the College and Julie's bridesmaid was Rona Hart from Norfolk.



We had our honeymoon in southern Ireland where there were some more distant relatives from my mother's side. Robin, Winnie, John and Binnie Atkins plus Olive and Tom Fuller and daughters Daphne and Sally. They lent us a house in Baltimore Bay with an Irish lady to cook and look after it. We also had use of a small car to go sightseeing. We were able to see where the old house (Burgatia) had been burnt down in the troubles. Our remaining relatives are all Protestants but manage to keep out of trouble.

Apparently, George Bernard Shaw used to visit here and go on horseback or walking along Rosscarbery Bay not far away. It was here you could collect the seaweed called 'carrageen', which we did. Apart from cough mixture, it is used to thicken soup. We saw all the usual things in southwest Ireland – Blarney stone, Killarney, Limerick, Galway Bay. Our local town was Skibbereen where Robin Atkins had a family grocery shop known to my mother. The Atkins also had a hardware store and a timber mill managed by my cousin Binnie. Her brother John was a research scientist all his life on genetic engineering sharing his time between Dublin and Salt Lake City, so he was not much help on the farm but was on the cutting edge in his profession.

We stayed in an upstairs apartment in Goldhurst Tce. Swiss Cottage, which was convenient but not heated. It cost £6 a week, quite expensive for a student. There was always something different to do every weekend in London. After a year, we went to stay with Julie's auntie Lily.

Trip to Europe in 1953

In the summer of 1953, Julie and I went to Europe in our little car to a Soil Mechanics Conference in Zurich. We took two senior lecturers from Imperial College with us, Alan Bishop and David Henkel. This was a good trip because although our French and German were limited, we were determined to battle it out in the small towns. We prepared many meals in the boot of the car and had to be careful about water because most sources were not drinkable then.

We went to Basel again, then Berne, Luzern and finally Zurich for the Conference. After the Conference, we went to Luzern and Marmorera Dam where I met the father of soil mechanics Karl Terzaghi through my Professor Alex Skempton. After that, we proceeded to Venice, which was a great joy was seeing it for the first time with so many marvellous buildings supported on piles in the mud with the water level slowly rising. Venice's historic past was fascinating to me while Julie was more interested in the artworks and building details. We stayed in a very central apartment near a very famous bell, which used to wake us up. I bought champagne glasses in a shop on the Grand Canal. I still have them now.

Somehow, on that trip we managed to fit in a side trip to Innsbruck, Zell am See, Heiligenblut, Maloja Pass, and the Dolomites where a large arch dam at Vajont had failed with the loss of 700 lives. The engineers finished up in prison for neglect of duty.

From Venice, we went to Florence, Rome, and Naples before returning via Pisa, Genoa, Nice, and Paris to London. The first great impressions of the famous cities are hard to overstate. The renaissance, bridges, sculptures, cathedrals on the one hand and the remains of antiquity on the other: aqueducts, harbours, theatres, cities, colonnades, the recent history of civilisation was a world previously undreamt of by me. I was so far behind my contemporaries in Europe and eager to learn as much as I could while overseas. But I also knew my family's adopted country offered many opportunities to underprivileged people such as most of us.

Julie had been to UK at least when she was 9 years old so she had some knowledge the history. She was inspired by painting, which she was good at.

Life in the UK

I had been to hydro-electric schemes in Scotland, walked over the Firth of Forth Railway Bridge built in 1885, visited Loch Fyne (Navy), Kyle of Lochalsh, Pitlochry (Road to the Isles). Stonehenge, Canterbury, most famous cathedrals, the birth of steelmaking, steam engines and railways in northern England and the home of jet engines, radio and television.

And then, in my lifetime I witnessed the decline of English manufacturing and engineering. They don't make engines, trains, and motors any more. This has been taken over in part by Germany but more by low cost countries in the Far East. The same applies to car manufacturing, computers, and automation. Unfortunately, Australia has fallen for the same way nowadays. Had I stayed longer in England there was not much more I was going to learn, so it was best we went back home and started to think about a family.

At the College, the English professors and lecturers were reasonably friendly to the large number of 'colonial' postgraduate students, but generally rather arrogant perhaps with some reason because their education in languages, history and social affairs was much more sophisticated than ours. However, a commercial problem was emerging for the country, which they did not and may not now perceive. London is really living on its money, buildings, history, and infrastructure accumulated over the last few centuries. It is still a very class driven society. If you are born into the upper classes life can be pretty good, but in my view unjust e.g. gentlemen and players in cricket at one time had to use different entrances for the same team.

Through all this period in the UK, I had written to my mother every week so she was not too bad all this time. I had also written to my boss Victor Munt who took an interest in everything I was doing. He never has a son of his own and in a way, I knew he was not well but about half way through my course, he unfortunately died at the age of 47. This was a great loss to me of a sincere boss and friend. Don Munro took over his position.

Age 29 – 35, Back to Australia, House and Family

383 Cambridge St. Wembley

We arrived back in February 1954 on the Esperance Bay. My father, Julie's mother, and my sister met us at the wharf in Fremantle 27 years after our family's original arrival. My mother could not make it. Before leaving, I had bought a small brick and tile house of Spanish style at 383 Cambridge St. Wembley, so we had something to go to straight away. We set to painting, getting some bits of furniture and planting some shrubs in the garden. It was a corner block so there was a lot of verge to look after.

There was still just a copper and troughs for washing clothes. There was a gas heater in the bathroom and over the kitchen sink. Our cooling was still a Coolgardie safe but before long my mother who had been saving some money, gave us an electric fridge, which was a great help. A washing machine came quite a lot later.

There was only one bedroom and a sleep out in this house so when our first child Susan arrived on 17 August 1955 she had to sleep in the lounge room. I still have many colour slides of Susan in the garden at Cambridge St. There were still some wildflowers growing in a bit of bush at the back of the block.

Geoffrey was born in December 1956 16 months after Susan, so Julie had her hands full. Somewhere around that time, I finally got a car through a government subsidy scheme so I had to build a timber and iron carport off the side road at the back of the block.

12 Kintyre Crescent, Floreat Park

It was now very apparent that a one bedroom house and sleep out would not do for much longer and we bought a block of land at a City Council auction in Floreat Park. This cost £865, which seemed a lot at the time. In those days, land could be sold off the plans and a few survey pegs with rough unsealed roads and no power, water or sewerage.



The block had two large gum trees on it; one jarrah and one tuart which we elected to get out by hand to avoid bulldozing the other trees. This involved hand digging large holes around the roots and setting fires with an auger and set some explosives, which you were not, supposed to do. We then yelled 'fire' so everyone else could take cover while the blast took place.

The large tuart near the front of the block was around 30m high and had lost a limb about 10m up leaving a hole in the trunk. By using long stepladders, ropes, and kerosene, I managed to set fire to the hole, which over several days burnt through, and the whole top of the tree fell off. We had to patrol the local road stopping any traffic, as the time of collapse grew closer. The top was so large it fell across the front of our block, across the whole 20m wide Kintyre Crescent and well into John Galvin's block opposite which he had just finished clearing. Then we had to cut up all the branches and drag them back to a great bonfire on our block. All the kids greatly enjoyed this whole process which involved a Guy Fawkes night and several birthday parties, all being great fun in the new suburb of Floreat Park.

We had some plans drawn up for a solar orientated house designed with glass facing to the majority of the northern elevation and solid walls facing to the east and west. This was a very unique design for the late 1950's. The first builder went broke, so we had to appoint a second one to finish it. Apart from the first builder going broke, the building of the house went quite well. We did our own landscaping and built the fences around the property to save money. The cost of the house was around £4,800, some five times more than the cost of the block. We brought as many shrubs and bulbs as we could from the garden in Cambridge Street and Julie's mothers place in 191 Charles Street, North Perth and my parents' house at 23 Emmerson Street, North Perth. This house must have been finished in around 1958 and my mother was still strong enough to come and see it.



Kindergarten

There was no kindergarten so we set about building one across the park, more or less in front of us in Brookdale Street (now Kirkdale Street.). We had a committee and used many devices for raising money including illegal gambling nights in various houses. The land was made available by the Perth City Council. We received some money from the Lotteries Commission and raised a loan for the rest from the R&I Bank (George Chessell) with guarantees from 10 local residents. There were not a lot of really wealthy people around in those days and people were not that keen on personal guarantees on a building on someone else's land. However, we finished up designing and building the kindergarten.

Of course, all of our children and all of our friend's children went there so it was a rewarding exercise for all. The kindergarten equipment was made by the fathers on the premises, including the outdoor playground. The hall was used for meetings of residents from time to time. There was never a hint of our guarantee being called up. I remember George Chessell (Bank) and Mackie Green (City Council) saying they would never let that happen and to come and see them if there was a problem.

Beach House at Quinns Rocks

Not long after this in around mid-1959, we had the idea of establishing a beach house and after looking around a bit came up with Quinns Rocks, a new subdivision where we bought two blocks one street back from the beach. These were good high blocks but without any power, water or sewerage. We paid 300 pounds each over 5 years interest free.

I set about making up timber frames in the garage at Floreat and did the footings, columns, bearers, and main beams on site. We carted all the frames in a single truckload. The walls were all up in mid-1960. Then we had to put on the outside wall cladding, timber floor, roof, and doors. It was all one large room to start with and first occupied by camping on the floor in New Year 1960. The windows were still sheeted up with spare wall sheeting and corrugated iron. There was a long drop toilet out the back and we cooked in a 5-gallon oil drum but it was all good fun. The car could be parked under the house and we had a washbasin and trough downstairs. However, we had to cart water in an old cream can for several months while we got some runoff from the roof in to a second hand tank we had bought.



The local building inspector was a very small Irishman and he could not climb high enough to see that we only had one room during the first year. Finally, over the years we got internal walls for the bedrooms and a proper kitchen. I planted suitable trees and shrubs, which grew very well as the years, went by. Quinns was my hobby over the years where you could drive nails in anywhere and add verandas from time to time. Eventually scheme water and power came which made things much more comfortable and we put in a septic system.

At the original Quinns kangaroos would come up to the back door but development gradually frightened them away. In addition, kangaroo paws used to grow on the hill behind us so the kids used to call it kangaroo paw hill.

Garden at Quinns

One of the really interesting things was the garden, which was composed of geologically recent limesand with a pH of around 8.4. Most Mediterranean shrubs would grow such as Figs, Grapes, Olives, Oleanders and herbs. Local trees such as Peppermint, Tuart, Teatrees, Bougainvillea, Shark Bay Gum, Bottlebrush, Olivacea, Broome, Christmas Tree, Hakea, Tamarisk, Woolly Bush, Sheoak, Umbrella Tree, Most Palms, Huegelii, Coastal Mort, Lantana, Baytree, Diosma, Rottnest Pine, Pencil Pine, Grevilleas Generally, Snakevine, Ivy, Cactus and Japanese pepper all grow fairly well.



Originally nothing grew more than 30cms high being mostly wire grass, but finally many trees grew up to 12m high and had to be severely pruned or removed eventually. Any silver leafed shrub such as saltbush would grow well. In addition, the soil builds up with organic material from leaf litter over the years. Later, after 60 odd years of pleasure, I sold these two blocks in 2016 and the new owner has still retained the old beach house.

Age 29-39, PWD Jobs

A Trip by Road to the North

In September 1954 six months after my return from Europe at the age of 29, I suggested to my boss Don Munro that I accompany an engineering surveyor Frank Butson on a long trip to the east Kimberley stopping at all points of interest in between. We had an Austin Champ vehicle had to be delivered to Wyndham and we stocked it up with all our camping gear, fuel, water, food, cooking gear etc. and set off from our home in Cambridge St.

Frank was a surveyor from the old school, not officially qualified but very experienced and had been to the Kimberley before during the war. Some of the food we took comprised of cornflakes, powdered milk, tins of fruit, tins of meat, rice, tea, sugar, flour, peas, beans, soups, dried potatoes. There was no gas so we used open fires with a hot plate and a Tilley lamp.

Our first stop was Ogilvy north of Geraldton on the veranda of a school because it was raining. The next stop was Carnarvon where we visited the long jetty originally built for sailing ships. It was in need of repairs from time to time because marine borers were attacking the timber piles. Silt was accumulating from the nearby Gascoyne River and the berths and approaches had to be dredged occasionally. There was a whaling station not far from the jetty, which has now been closed down and has become a tourist attraction. Bananas and other fruits were being grown along the river flats using water from bores in the river sands as is done now on a larger scale.

The road onwards was extremely boggy due to recent rains especially near the Manilya crossing where we got a grader to pull us through new roadwork. We also picked up fuel at the local station, which we had to pump out of a 44-gallon drum taking care to see it did not contain any water to upset our carburettor.

Exmouth, Onslow

Just north of Manilya, we took a turn to the new town of Exmouth where the US Navy Base was being constructed at that time. The big steel jetty at Point Murat using steel jackets was of interest and so was the erection of the transmission towers each about the same height as the Eiffel Tower and supported by steel guy cables. They used Navajo Indians for this, as they have no fear of heights. Exmouth had been an Air Force Base during the war and also used for servicing submarines and other vessels in the Gulf.

From Exmouth we had to backtrack to Manilya and worked our way up to Onslow where the PWD had a jetty and a water supply. Several jetties had been damaged by cyclones and this one was abandoned in 1961 after such an event. The original town had been at the mouth of the Ashburton River to the west where sailing ships could get up the river but this was no longer viable when the river suddenly changed course during a flood.

Subsequent efforts to maintain a jetty just to the east never lasted long and eventually in 1926, the whole town was shifted to where it is now. Onslow had fuel oil tanks during the war, which could refuel submarines.

Cossack, Roebourne, Port Hedland

From Onslow we went through to Cossack and Roebourne because Karratha did not exist then. There had been a hard-faced jetty at Cossack for sailing ships but this had become silted up in storms. A timber jetty was then built at Point Samson (Port Walcott). It had been fairly successful and was used for shipping asbestos in bags among other things before the health dangers were realised. That jetty is now gone but Port Samson has become a little tourist centre with its own marina for small boats.

From Roebourne we went to Port Hedland, the largest of those coastal towns. It had its own wharf in the local tidal creek but there was an offshore bar, which was very shallow at low water. The PWD regional engineer and foreman used to be resident at Port Hedland. My best friend Malcolm McCleery was there and spent a small amount of time at Port Walcott jetty where he must have picked up the asbestos fibres, which killed him 30 years later. There was a railway line out to Marble bar servicing the small local mines out there. This was the first railway line in the Pilbara but it was quite small and has long gone.

Broome, Derby

The trip from Port Hedland to Broome is around 600 kilometre's and was very sandy in those days, particularly a notorious stretch known as 'the Pardoo Sands'. You needed plenty of water for the radiator and good de-bogging gear. It was best to start early in the morning. The original track was quite near the coast and was relocated further inland when a sealed road was built.

We finally got to Broome, which was interesting even then with its background of pearling and bombing during the war. It was the first place that felt a bit tropical with nice trees and shrubs all around. I remember walking out to the end of the original town jetty both on it and under it at low tide. Ships used to sit on the bottom here and at Derby and Wyndham at low tide. Pearling luggers used to shelter from cyclones up in the mangrove creeks as they still do. This was the first place there was any evidence of sea snakes and crocodiles but no one cared very much. The water supply was run by the Shire and depended on a good supply of ground water. The PWD was not strong in Broome. I also remember camping at a bore just out of town where there was a very heavy dew and our gear got quite wet.

Next, we went to Derby, which was smaller, and a PWD town with reasonably good tidal jetty and water supply from bores. There was a leprosarium east of Derby because this disease affected the indigenous population very seriously without any cure. The stations inland from Derby were quite prosperous because of good seasonal rainfall and generally good soils. Some were legendary such as Liveringa, Kimberley Downs, Go Go, Fossile Downs etc. Lowly PWD officers would be received politely but not that welcome generally.

Liveringa, Camballin, Fitzroy Crossing, Halls Creek

On the way out from Derby, one of these stations, Liveringa, had subdivided some of its land known as Camballin for research by Kim Durack into irrigated agriculture such as rice and sorghum growing. We went out to see how Kim was going. The PWD had been helping him for some years and he made us most welcome. He had built a stone homestead looking out over 50,000 acres of blacksoil flats. He gave us a meal and we had the first of many discussions over the years.

It was here that I met a newly employed PWD surveyor called Cyril Ion who became a key player in the efforts of the PWD in the Kimberley. Kim was pumping water out of a billabong on Uralla Creek and we eventually provided a more sophisticated diversion from the Fitzroy River itself, which flows for a substantial part of the year. This is the type of thing I had to come up north to see.

From Camballin we went to Fitzroy Crossing, which was already a historic settlement, then past Go Go and on to Halls Creek, which had had a flutter 50 years previously as a gold prospect. Halls Creek was on stony ground on the headwaters of various smaller rivers so it played no part in what we were thinking about.

I remember camping out one night north of Halls Creek where it was extremely cold – enough to freeze open water containers. We proceeded past Turkey Creek and Dunham River in to Wyndham, which was the end of our trip, and we could get ourselves organised for an expedition on to the Ord River.

Wyndham, Frank Butson

The local District Officer at Wyndham was 'Dizzy' Donovan who had gone a bit 'troppo' but was quite helpful. There are many funny stories about this area and its people, which may come later in an appendix. There was an established seasonal meatworks at Wyndham with its own jetty. It also had five or six pilot's houses and we managed to commandeer one of these. There was a two-storey hotel with wide verandas and a hospital almost next door. There was a Post Office and a Police Station.

On this long trip up from Perth, you could never find a better travelling companion than Frank Butson. He was generously passing on a lifetime's experience as a surveyor in the south-west and north of the State. He knew lots of people - and whether they were any good or not. He also knew many station people and above all, he understood a lot about Aboriginal people and their culture, which was rare at that time. It turned out he had a fine bass/baritone voice and used to sing in a choir including 'The Messiah' at Christmas time. The Civil Service wanted to see qualifications which Frank did not have, but for me his qualifications were very special indeed and I greatly valued his friendship and assistance.

I think on reflection I never told him this but he must have known it.

The Ord Adventure

Argyle Station, Monsmont.

From our base in the Pilot's House we set off in the 'Champ' with our supplies replenished, for the main purpose of our trip – to see the Ord and what I could do about it with all the experience I had gained overseas. We passed by Ivanhoe Crossing which had been completed by the Main Roads Department (Bill Wright) a year or two previously. We called in on the "Kimberley Research Station" which had been going several years by that time, and then on towards Argyle Downs Station via the notorious 'Cockatoo Sands', another very difficult few hours.

Finding our way to Argyle Downs was not difficult, but beyond there it was more demanding. The station kindly lent us one of their best Aboriginal guys 'Mundy'. We went out to Monsmont on the Ord where any river gauging up to then had been conducted. The PWD used to send people (sometimes students) to this site for the whole of the wet season to record river levels and velocities 24 hours a day when the river was running. This had ceased in 1947 after the war so I intended to ask my boss to get it going again.



However, there was a problem that this site was a long way from the possible dam sites and high flows could run out over the riverbanks on both sides at that point. Therefore, I wanted to shift the gauging site nearer to the potential damsites. This meant getting our way in to sites that had not been visited since wartime. Frank had been in but that was 10 years ago and the tracks were all overgrown. The station people never went in because it was too rough.

Coolibah Pocket, Damsites, River Gauging

It took us 2 days to get in about 30 kilometres from Argyle homestead. We depended on Frank's memory, a few wartime aerial photos, and whatever signs of a track we could find. Mundy also helped but his access by foot had been along the riverbanks, which he knew well. We blazed trees as we went and finally emerged in Coolibah Pocket, which was a fairly small flat area between two of the likely dam-sites. The most favoured one was the upstream one where levels had been taken and sketch drawings made for a concrete dam with a spillway over the top.

My experience overseas told me that such a dam was going to be very expensive because of the high cost of labour in formwork and cement which would have to be shipped in. It so happened that in the previous year there had been floods, which had exposed rock in the foundations half way across the riverbed at another site at the lower end of Coolibah Pocket. This indicated that the quartzite in the foundations and abutments were reasonably continuous and although the site did not look as dramatic as the chosen one, it would be quite suitable for an earth and rockfill dam using materials that were readily available in the hills nearby. In addition, there were several alternatives for a spillway in creeks and depression away from the dam itself. I took photos and put the proposition to my boss Don Munro when I got back to Perth and he readily agreed.

Regarding the river gauging station, I decided to shift it from Monsmont to this site and put a cableway across the river so we could run a two-man trolley across to take accurate velocities and obtain samples giving the amount of sediment in the river. This was put in next dry season (1955) and a reasonably comfortable camp set up with cooking and sleeping equipment. The guys used to have 'Trager' pedal radio communication and a vehicle, but we always gave them horses as an emergency.



On weekends I would go walking down the river with a rifle not so much for the 'crocs' which were numerous but for the 'scrub' bulls which could be quite belligerent until a shot was fired at them. Wild donkeys had also become a problem in the Kimberley's having been turned loose by early teamsters. They made a terrible noise at night when drinking at the billabongs.

Mundy was always happy camping out on the river. He would help with anything that needed doing such as getting out of bogs and telling us where the river could come up to in flood time. He used to try to teach me 'black tracking' but to no avail. He knew when the vehicle's engine was giving trouble and needed the fuel lines blowing out. He took this over as his job.

A year later, I brought my boss Cyril Dimond, the Engineer for the North-west, to the new dam-sites and walked them several kilometres upstream through the old dam-sites. Mundy must have noticed us coming through Argyle and made his own way out along the river where he waited till the right moment when he came out from the bush and said in his best style 'Good morning Mr Lewis'. The other two were and remained dumbfounded as to how this could occur.

In the first year of river gauging at this site the river flowed up to 86 feet deep almost up to the cableway at velocities of around 20 ft/sec. It carried whole trees here and there so you did not want to get your gear from the trolley tangled up in those trees. If you got dragged into the river that would be the end of you. This flood came in to the camp, kitchen, and the vehicle/generator. The first message I got from the students was something like "River flowed 86 feet deep, part of camp under water, bedding shifted to higher ground, some of food gone, vehicle bogged, horses released, otherwise OK". The student's mothers used to ring me almost daily about their sons welfare so I was pretty relieved to hear from them. Dizzy Donovan had sent a light plane out the day after the flood peak so we knew they were still there.

This completed my visit to the north with Frank Butson so we flew back to Perth in a DC3 aircraft on the 'milkrun' stopping at many stations as well as Halls Creek, Fitzroy Crossing, Derby, Broome, Port Hedland, Carnarvon and Geraldton. It took all day to get back and Julie was pretty pleased to see me in one piece after many weeks away without much communication. This was a memorable learning curve for me, which served me and the State very well over the next 10 years.



1954 Onwards

This was the most productive period of my life. Susan born in August 1955 and Geoffrey in December 1956 were growing up and soon to attend kindergarten. Julie was doing upholstery, potting and starting to write in her spare time. We all had busy social lives, used to take the kids with us, and put fruit cases in the back of the car so they could sleep there if they needed to and not have to be woken up.

My mother could still get around a bit. Dad would drive her to Floreat occasionally and she could walk around the garden before having to sit down. In 1959 the first Russian space rocket (Sputnik) went in to orbit and could be clearly seen in our skies which was of great interest to all including my mother whose eyesight was still good.

In the PWD, I had been put in charge of Planning, Design, and Investigation for water supplies and hydraulic structures. Both the raising of Mundaring Weir and Wellington Dam had been completed. There were now lesser earthen dams such as Waroona, Drakesbrook, Harvey Raising, Logues Brook, Manjimup, and Bridgetown (Millstream) to be done together with water supplies for the remainder of around 30 small towns in the south-west. Albany and Geraldton needed to be substantially increased. The goldfields and agricultural areas were outside my scope.

However, a large part of my personal efforts were in preparing design layouts and estimates for the Ord River proposals as well as improving the water supply to Camballin where Kim Durack had been replaced by a Murrumbidgee rice farming outfit called Northern Developments (Farley, Gorey). This kept going reasonably well but there was always the threat of extreme flooding from Fitzroy River, which was known to cover the whole of the Liveringa/Camballin flats every few years. I also prepared plans for protecting the town of Carnarvon with levees from flooding by the Gascoyne River after the whole town had been evacuated one year. This worked well and has been extended from time to time.

Fitzroy River

I set up river gauging stations just south of Dimond Gorge, at Fitzroy Crossing and on the Margaret River, a major tributary from the east. A relationship was derived for annual flow against annual rainfall so that the flow in other large rivers in the Kimberley could be assessed. Some of these rivers were the Lennard, Charnley, Isdell, Prince Regent, Carson, Durack, Chamberlain, Dunham, Pentecost, and Gibb.

Dimond was a spectacular gorge on the Fitzroy. It was very hard to access on the ground via the nearest station Fossil Downs. However, the PWD engineers from Derby worked their way in, (Abercrombie, McConnell). It was later found that easier access was available from Mt. House and Mornington off the Gibb River Road. Originally, this site had no name so I proposed it be named after Cyril Dimond, an Engineer for the north-west who was aware of the site but suffered a serious stroke at the age of 51 and could no longer communicate. Aerial surveys and contours were done on this site so that capacities at various heights could be determined. A spillway was found a few kilometres north of the dam and diamond drilling was done to confirm the abutments and foundations. It was in every respect equivalent to the Ord so surveys were also completed under my instruction of the irrigable lands downstream. However the “greenies” started to get involved and it was felt that the Ord should proceed further before the Fitzroy could get going, a great shame in my view.

Serious work was done on the Lennard River, which was much smaller with a lesser flood problem. A dam site was located and contoured. The irrigable area was large enough to utilise the river flow available and being closer to Derby, it may one-day suit a less ambitious scheme than the Fitzroy.

1957 Trip to Europe

In 1957 at the age of 32, I gave a paper to the International Commission on Large Dams held in Rome. I met some people I knew before and some new ones including a few from Australia. On this world scene, an Australian is fairly small fry. I stayed at a small exclusive hotel in the southern part of Rome (off Bruno Buozzi) where I was booked in by the Italian organisers. I have rarely experienced such pleasant living, so very quiet and close to transport.



The conference was held in the United Nations Building near the Caracalla Baths. I also met up with some Australians working for UNESCO. They were living very soft lives on fancy salaries and allowances, which grated with me.

This was a great chance for me to explore all the bridges of Rome as well as many other buildings of antiquity. There was the usual trip to northern Italy including Milan and Turin to see current dam and tunnel construction in that part of the Alps. There was no scope for that type of dam construction in Australia but all the tunnelling in hard rock was relevant. We also went to the Val d'Aosta, which led to the tunnel and aerial ropeway through and over the Alps to Chamonix in France. This was extremely scenic and apparently, a favourite place for Mussolini to visit.

India 1960

The Engineer for Irrigation, Dave Bryden and I went for an extended trip to India and Pakistan to study their irrigation systems including dealing with sediment, river diversion and flood control as it affected our work on the Ord and the Fitzroy. This was more relevant to our problems than what we could find in America.



This involved seeing various structures by British engineers on the tributaries of the Ganges, and down the east coast of India. We then went to Pakistan to do the same thing on branches of the Indus River. I wrote a Paper for the Institute of Engineers on these experiences. One very useful idea was the use of automatic collapsible gates on river diversions combined with automatic sediment excluders, which had not been used in Australia up to then. We used this very successfully on a low cost diversion on the lower Fitzroy at Uralla Creek. A gantry hoist, which travelled on rails through the flowing water, was used to pull the gates up again to store water. At first, the men were very nervous about using this gantry but when Dave and I demonstrated its operation under real flow conditions, you couldn't get them off it.

While we were in India, our hosts kindly took us to the Taj Mahal to see it around 10.00pm one night in full moonlight on our own. I have never forgotten this experience.

France, Russia 1961

I went as an Australian representative to a conference on Soil and Rock Mechanics in Paris followed by a meeting of the International Commission on Irrigation and Drainage in Moscow. By then I was pretty much on top of anything worldwide which could affect what we were doing on the Ord and its first stage irrigation system.



The French trip included a visit for some of us to a site at Frejus (near Nice) where a large arch dam had collapsed killing many hundreds of people. The reasons for this lay in weak layers in the abutments, which allowed the dam to move slightly and crack. Large lumps of concrete up 10m cubed were found in the river valley afterwards and very little remained where the dam had originally been.

In Russia, they were building dams on large permanent rivers by methods unheard of to us such as dumping large rocks from cableways in to flowing rivers, followed by gravel, sand, and clay until the flow finally more or less stopped.

Irrigation was on a very large-scale supplying water to collective farms around 25,000 acres each. There was not much incentive but they grew very good cotton. The most relevant areas were on the north side of the Himalayas where the rivers were not so large and the climate more amenable especially in summer. This was the area of the Marco Polo treks and Alma Ata and Samarkand etc. The people were mainly Muslim and very friendly to foreigners like us who they did not see much of at that time. I was shown the area where the American U2 spy plane had been shot down and the pilot Gary Powers captured alive amid many denials by the US.

When in Moscow we were given a special viewing of Lenin and Stalin lying side by side in a very lifelike state. We were also shown the nose cone and harness in which two dogs had been launched in the space orbit and returned, one safely. The machining and wiring were very rough indeed. Their advantage lay in the fuel they were using apart from the German technology.

The intourist guides were very well trained to answer any questions they might get from visitors like us. Whether they had other private views, we never found out. At no time did we feel under pressure but the Russian attitude against the Germans was apparent everywhere. They were devastated twice by the Germans in 30 years and determined not to let it happen again if they could avoid it.

The Ord 1959 to 1963

A lot of my work had been leading up to the Ord River Project. The PWD and the State of Western Australia applied to the Federal Government for funding assistance and in 1959 a bit to our surprise, it was agreed to on the eve of an election. I felt the 'Feds' thought we would never be ready to make use of the funds and I well remember the Director of Engineering, Jim Young calling Don Munro and I into his office and saying "...well you asked for it – what are we going to do now?" He was an ex Main Roads Commissioner and little realised how well prepared we were.

As I mentioned earlier, on the trip to America in 1951, I had seen some radial gates on the Canyon Ferry Dam in Montana and knew they would be ideal for use in the Diversion Dam across the Ord River at Bandicoot Bar upstream of Ivanhoe Crossing. It would be necessary to clear the whole waterway in flood time so that the river was unimpeded. Such barrages existed on the Murray River but were much smaller and relatively cumbersome. Using radial gates, which were 50ft wide and 37ft high, would require 20 such gates. To test the design we made a three dimensional hydraulic model of the Diversion Dam and a two dimensional model to calibrate the flow through the gates at various openings. This was published in a paper to the Institute of Engineers. The design investigation modelling work was undertaken at the PWD/UWA Research Station which I was responsible for establishing - to provide specialised knowledge for hydraulic modelling.

The PWD had limited staff and no previous experience with any gates of any kind of this magnitude so we needed to get a proven design such as the ones at Canyon Ferry. They were a riveted design like the Sydney Harbour Bridge to avoid any complicated stresses that might be caused by an all welded design. I duly got approval from the US Bureau of Reclamation and very soon found out that the State Rivers and Irrigation Commission of NSW had been through a similar exercise and come to the same conclusion for six such gates to be used at Keepit Dam in NSW. They had converted all the drawings and specifications to Australian standards including the seals to the gates and lifting gear and kindly allowed us to use all this material. Together with the gates we needed steel stoplogs so that the gates could be serviced and a bridge over the top which was undertaken by Gilbert Marsh of the Main Roads Department.



Construction commenced in 1960. Newly employed PWD staff constructed all the foundations, sills, and buttresses. They also constructed the pumping station, channels and farm layouts under my direction. The Ord Diversion Dam was completed in late 1962, and still operates as well now as it did then.



The Ord River Diversion Dam
(During late construction in 1962)

Kununurra

There was also the matter of a town, which was essential from the beginning for supervision of construction of the Diversion Dam and the irrigation system for 30,000 acres to crop. We needed a place reasonably central but not on the blacksoil flats which comprised most of the irrigable lands. We identified the site where the town now is, close to Lilly Creek and some nearby hills but primarily on sandy soils. This site was not central to future irrigation but by then another town may be needed anyway. Don Munro and I chose this site and started off the surveys of the streets sometimes working at night under vehicle headlights. We varied it as we went along. We never had an approved structure plan or any environmental approval. We just did it. We used a town planner called Long who eventually moved on to become the town planner for Darwin. There was an inter-departmental committee that met fairly often but the Ord was a long way away and not very high in the priorities of departments other than the PWD, which chaired the committee. For many years, this plan seemed to be too spread out but as the years go by that spare land is being taken up. We had to organise a diesel power station and a cotton ginnery, which was all very stimulating.

The name of Kununurra was taken from the established name of the predominant black-soil called Cununurra clay. The origin of this was Aboriginal and appears to have referred to 'big river'. Many names were proposed by different Government leaders but the PWD favoured the existing name with the 'C' changed to a 'K' of which there is a record of me having put it up on behalf of the PWD and Charles Court having accepting it.

There was no population in the area black or white apart from Kimberley Research Station and Ivanhoe Station on the other side of the river (west). There was Durack station and Argyle Downs, which was eventually to be submerged by the waters of the Main Dam (1973). Ivanhoe was a home at many times to the Durack sisters Elizabeth (painter) and Mary (writer). I of course knew them but spent very little time at either station.

There was no airstrip so we built one on brown levee soils near the town. This is still in use but has been widened and extended over the years. It is now quite a busy airport for a country town with lots of small aircraft used for surveys, crop spraying, and tourism.

The Main Dam

As design work on the Diversion Dam and the Irrigation area gradually tapered off after 1961, we increased activities on the Main Dam on the site I had suggested. This was to be an earth and rockfill dam with a separate spillway. This was a particularly good dam site in that it only required around 2.5million cubic metres of fill. The tricky bit with such a design was that it had to be completed in two wet seasons. In the first, the foundations had to be excavated and backfilled to around 10m above the riverbed. This work had to have a rock covering secured by steel anchor bars so the wet season river could flow over it safely, and then in the second dry season, all the remaining fill had to be placed without fail. There were tunnels built in the right hand abutment for the water offtake but this was nowhere near being big enough to carry the flood flow of the Ord.

Part of this procedure was that the contractor was to have all of the rock-fill broken beforehand so there were no delays in the quarrying operation. A much smaller dam had been built using this method in Tasmania and one of our engineers had been involved in that work. We also used the Snowy Mountains Hydro Electric Authority as consultants which gave us access to their experience, but even more a 'tick' from them was a big help in getting Federal funding for the Main Dam eventually.

I had left the PWD by the time the main rock fill dam was constructed on this site.

Tidal Power

Over the years 1960 to 1962, I had imagined the idea of trying to harness the energy of the high tides along the Kimberley coast using dams in the inlets to large natural basins generating power on both incoming and outgoing tides as was being done at La Rance in northern France. I wrote a paper on this for the Institute of Engineers in 1963 and we got help from French consultants called Sogreah, particularly for a site at Secure Bay, which is a very spectacular natural site. Many articles were published in the newspapers regarding the tidal power in the Kimberley's which are attached. We dreamt of using the Russian methods to close the gaps and pumped storage to provide constant power, but there always was the problem of lack of sufficient load to make it economically viable .

The tidal power concept of 1963 was revived by a Select Parliamentary Committee in 1992 and the proposal was supported by various Commonwealth members of parliament but without transmission capabilities to main population centres it was still considered before its time. Smaller proposals at Derby, Wyndham, and Cape Keraudren have been considered as local demand has grown. There is a current proposal by Tidal Energy Australia who I am still involved with at Doctors Creek north of Derby. This is for 40 MW initially but capable of being increased to 160MW. Environmental approvals have been increasingly difficult but it appears viable against diesel, coal, or gas despite the high capital costs involved.

I still believe in this age of renewable energy, tidal power will one day become a reality in the Kimberley.

Age 39, Onwards

1964 to 1970

In 1962, my health appeared to be failing with a heavy workload and birth of our second son Donald. I took quite a lot of time off and gradually recovered. Eventually in 1964, I resigned from the Civil Service, which had been good to me, but in return, I had given a lot back to the State. The enormity of the filing system was a problem to me although I was good at dictation and kept two secretaries going.

I took up employment with Leon Halpern and Graham Glick (Halpern & Glick) which was an engineering consulting practice in West Perth. There were to be no more big dams for me but curiously, the age of big dams in Western Australia was now passing anyway. (The Harding was the last). I was made a partner in the firm, which became Halpern Glick & Lewis.

Minerals Boom Consulting

This was the time when a minerals boom was coming to WA in iron ore, nickel, and gold and soon after that in oil, coal, and gas. These were outside my training but provided work for consultants who generally had been having a hard time previously. Hamersley Iron was the first big one with a railway from Tom Price 270 kilometre's long to a new port and town in Dampier. There was no part of the PWD in any of this. The big railway builder and operator was MKMO (Morrison, Knudsen, Mannix, and Oman ex US). They were also on a learning curve but had a philosophy that if you made a mistake, just hop in and fix it quickly.

Next came Mt Goldsworthy, Mt Newman, and Port Hedland Harbour. This was a great dredging job of world class by Utah and the Alameda. The cutter teeth would have to be replaced every four hours. Finally, in that group of iron ore mines came Cleveland Cliffs using the softer limonite of the Robe River and a port at Cape Lambert near Roebourne. For that job, we got a lot of consulting work locating the railway line in a most difficult part of the Pilbara. An option we studied was to go to Cape Preston where the Chinese have now developed a port for shipping magnetite ore.

It seems the Chinese are having trouble crushing and refining the magnetite, which is hard to understand because this is standard practise in Michigan in the US. I went there in 1967 at Cliff's invitation and witnessed this process in very hard rock (taconite) using autogenous grinding and separation by gravity, magnetic and even hot float process. Much of this was under snow and ice for 6 months of the year. This was the type of fine feed that was used in pelletising plant to suit use in blast furnaces. Australia has never been much good at pellet plants and upgrading of iron products. For example BHPB's hot briquetted iron plant at Port Hedland and Hamersley Iron's 'Hismelt', which was eventually sold overseas. Newcastle has all been closed down and Wollongong appears to be not going anywhere.

Dunham River

In 1965, I met a group of American cattle men/investors in Darwin and took them around various properties in the Northern Territory and Kimberley where the Ord was now operating. One of them, Bob Goddard, bought a station called Dunham River on which we later built a small dam and irrigation area for him at a place called Arthur's Creek. During that period I examined some truly marvellous dam sites on the Dunham River itself but they will have to wait for another generation or so. For this purpose, we used Aboriginal guides off the station now called Doon Doon. One called 'Puddin' was a great help as usual. Although they had 303 rifles they would not stand their ground against scrub bulls coming out of a gorge as I found out.



I had a helicopter at my disposal and covered most of Dunham, which was a rough piece of land, but okay for horses if you had the time. Speewah was an especially interesting area for minerals and there was a difficult stock route through the back of the station. I also found a way to divert the Chamberlain River into the Dunham one day. Since my exploration of this area, Argyle Diamond deposit was discovered and developed, but I never found a single diamond despite having looked everywhere I went. Up and down this area from north of Kununurra to south of Halls Creek remains very prospective for base metals. The Bungles were known at that time but difficult to visit. Access was better from the east but not near any proper roads.

The irrigation area was used for sorghum and other crops originally to fatten cattle and more recently for growing red claw freshwater prawns in ponds but predators were a problem. Finally, it has been used for sandalwood like a lot of the Ord. This small area of perhaps 5,000 acres plus the dam on Arthur's Creek was sold for \$18 million for that purpose just a few years ago.

Onslow Solar Salt Project 60's and 70's

In the mid-1960s along with partners, Leon Halpern, Graham Glick, Neville Hammond and Jack Tomich, the Onslow Solar Salt Project was conceived. Approvals to develop the project and were granted, funding was arranged through our overseas partners and construction commenced. However soon after, the overseas partners withdrew and the project did not proceed, which was a great disappointment at that time.



1970 Onwards

I was now 45 and felt the most innovative part of my life was behind me but maybe this was not so. Susan was 15; Geoffrey was 14 and Donald 8. I left the consulting practice of Halpern Glick and Lewis, which had built up a lot, and continued doing private consulting and development work with others, on subdivisions, shopping centres, and apartments. I also acted as an engineering expert for iron ore train derailments, washouts on railways, mining, and port problems. We had been used to going on trips in to the outback and 'up north' with caravans and tents. We all enjoyed it; but it was never much of a 'holiday' for Julie.

In around 1974, we all went on a trip to England and Europe. We met most of our relatives and travelled for a month in Europe on a very good bus. I remember Donald sorting out the transport system in Paris and Rome quickly at age 12. This was a great introduction for the kids so we believed.

About this time, Julie had gone back to school teaching mainly in catholic colleges and became serious about her book club and writing. We often spent a bit of weekend time at Quinns. Julie used to like inviting her writing friends out there as well as her mother, Irene Heath.

My mother died in 1960. Dad then sold the house in Emmerson St. and bought a place in Essex St. Wembley. He married again to a lady called Peggy who we did not like very much. He finally died in around 1970 after a series of strokes.

Richenda Adventure

In around 1975 a prospector in Derby names Jimmy Stuart, a Scotsman brought in a prospect he had found and pegged for base materials in the Richenda River catchment not far from the King Leopold Ranges. This could only be accessed by four-wheel drive from Fairfield outstation. Jim had camped for some years in this country and used to survive all through the wet season on his own. He had a radio and a kerosene fridge. He used to listen to the cricket and the news. When he went to Derby, he would go on the grog and needed days to dry out.

Jim had dug a costean in to a gossan outcrop that was rich in copper, lead, and zinc. He was really looking for gold, which he panned for in the streambeds. The local creek was called Coleman's Creek after another prospector. We drilled around Jim's gossan but never found anything more extensive. Jim had another prospect called Turtle Creek about 5kilometre's further into the ranges. This comprised a number of outcrops of galena (lead sulphide) but further on was a gossan hill that was very exciting. We costeaned it with a bulldozer and put in a number of drill holes. There was mineralisation at depth but cut off at both ends by faulting. What people were looking for was large low-grade deposits particularly of copper. Some of these assays went as high as 20% arsenic. This type of mineralisation over 400m must have come from somewhere but we could not find it nor could we interest any big players in it at the time. This was fascinating country not far from Mt. Broome, which in the early Goldrush days had attracted prospector's attention. This was not financially rewarding but I loved every minute of being in that country. On one of the first trips, I took Donald (age 12) to help with dozing a better access and a small landing strip. Julie had given him a red tee shirt so he wouldn't get lost but the scrub bulls didn't like that at all.



At a later time, I took both Geoffrey and Donald in using Geoffrey's Nissan and a trailer with 44-gallon drums of fuel. This time we were looking for diamonds in a couple of kimberlite outcrops, we had found near Mt. Rose a beautiful mountain. This was spectacular country but again no diamonds despite geological help from John Myatt and Bob Pickering. Hancock Prospecting (Kevin Dalby) had also assisted us in joint venture. No doubt, someone will find something commercial in there sometime.



Land Development

During the 70's and early 80's, I developed land for residential subdivisions and shopping centres. These included; the redevelopment of the old Thornlie Golf course for a residential housing estate and shopping centre (Spencer Road), Belmont Forum and Riverton Forum shopping centre.

Aged 60 and Onwards

Darwin Hotel

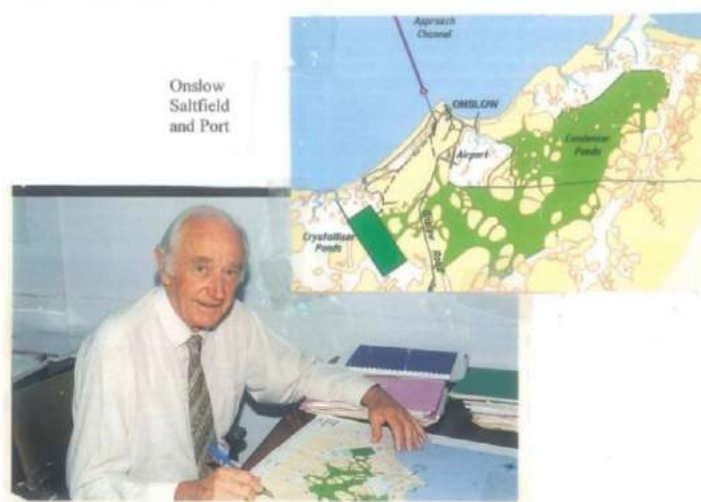
Sometime around 1986 on a visit to Darwin, I found a useful piece of land on a corner block on the front street overlooking the harbour. This was zoned for hotel use and I felt an atrium style hotel -like the one built by my friends at Mandurah would be very suitable for that site and meet an existing market.

I found the Government would encourage development of this site by accepting \$50,000 deposit and the balance interest free on second mortgage over 5 years. I paid the deposit, got hold of my friends and the architect who all agreed and we got Taylor/Woodrow to construct the 8 storey high building. All of the funding came from Partnership Pacific (Westpac) so this was a good deal. My friends (Connors and Price) ran a hotel management company called 'All Seasons Resorts'. The only snag in this was we took on a 50% partner from Adelaide (Tricontinental) to firm up the ownership and provide guarantees to the bank. Within a year, Tricon had gone bankrupt so we were left with it but fortunately, the hotel was running well. Westpac took over Tricon's shares as an interim measure but in the end we all sold out to another operator which was a pity, but we all had personal guarantees we wanted to get rid of.

Onslow Solar Salt Project 1990-2000

In the early 1990s, my son Donald and I decided to revive the previous plan to develop a solar salt field on the salt flats near Onslow. The original project commenced construction but was not completed because it was too remote from support, so this time we decided to go for a smaller field on the salt flats around Onslow. It required a seawater pumping station in Beadon Creek, 75 square kilometres of condenser ponds and 8 square kilometres of crystalliser ponds just west of the town to produce 2.5 million tonnes per annum of shippable salt.

The jetty extended out from Beadon Point for about 1.3 kilometres and accessed by a dredged channel about 10 kilometre's long to a depth of 10.8m, which was enough to take 45,000dwt vessels. After several attempts, our group which included most of original partners finally proceeded with a Dutch firm called Akzo Nobel in 1997. The project was developed and first produced salt for shipping in 2001. Akzo Nobel sold the Onslow Salt project in 2006 to Mitsui who also owned Shark Bay Salt. All round this was an interesting and successful engineering experience. It cost around \$60 million including port works to construct at the time. This would now cost a great deal more.



Caustic Soda

Following completion of the salt works, it became apparent that a lot of the salt was being used in Japan, Korea, Taiwan, and China for making caustic soda and chlorine for plastics where the real money was being made. These products are made by electrolysis, so cheap power is needed which those countries don't have. It would seem obvious that Australia should be making the caustic soda and chlorine but it is too dangerous to ship chlorine. Normally the chlorine can be made safe via ethylene dichloride but there is very little ethylene available in Australia especially in the Pilbara.

It so happened that Jan Heber of Norsk Hydro had a good but unproven technology for making ethylene and decided to join us. We took the whole idea to John Roberts at Multiplex. He liked it so Don and I went to work in Multiplex office in 2000 which led to many things happening. Unfortunately, Jan Heber could not convince his bosses to go with a full-scale plant in the end but it will happen eventually. When working with the strength of Multiplex this let Don especially and I into many interesting projects including, the Bayu Undan gas pipeline to Darwin and the first desalination plant for Perth's water supply as well as building a mineral sands plant and jetty in Mozambique for Kenmare.

Bayu Undan Pipeline

This was 507 kilometres long totally under the sea. Through Multiplex, Don called international tenders and received four offers - to the surprise of many. One of these was Siapem who were successful. The pipeline was 30 in. dia. x 1.0 inch wall thickness. It was made in Japan, shipped to Malaysia for concrete coating, barged to the pipe welding, and laying vessel. The pipes never landed onshore in Australia because that would have created many problems. There is only one pump station at the Bayu Undan well site and no intermediate pumps in a distance nearly as far as from Perth to Kalgoorlie. When the lay barge settled down to its work, it would weld and lay four kilometres per day. It was important to get the tension in the line right so it did not buckle and equally important to check all the welds before they went over into the sea. The project was a great achievement and financial success.

Desalination Plant for Perth

Don and Multiplex worked closely with the Water Corporation arguing that desalting of seawater on a large scale was successfully employed mostly in the Middle East using French technology. This used high pressures forcing seawater through selective membranes.

Don formed a Joint Venture between Multiplex and one of the French companies to design the first plant on the coast in Cockburn Sound near the old power station. It involved a seawater intake, high-pressure pumps, and batteries of circular membrane units, which could be cleaned up and returned to service every so often. Not a lot of chemicals were used and the main cost was power for the pumps. The used seawater now had a higher salt content than originally and was returned to Cockburn Sound via a dispersal system. This is where most of any objections came from people saying the higher salinity effluent was not being dispersed enough and the whole of Cockburn Sound's marine life would suffer because the interchange by wind and tide was too small to cope. Even responsible engineers such as the Water Research Foundation of UWA joined in for a while but you could prove on one sheet of paper that the contention was untrue as it proved to be in practice.

After Perth set the example, most other cities in Australia followed because they were also running out of fresh surface water. What the process did was to drought proof the City of Perth for the foreseeable future. Now another desalting plant has been built north of Bunbury and this is being doubled so that 50% of Perth's water is being supplied by desalination and Perth's population growth will no longer be controlled by this factor. This was a great success for Don and Multiplex and would have led to other work but when John Roberts died with diabetes/leg problems, there was no driver in Multiplex for this sort of work.

Don's Work in Africa

In around 2005 Don had taken Multiplex through a design and construct project for a mineral sands plant in Mozambique using equipment abandoned from a failed operation known as Beenyup near Augusta in Western Australia. Don arranged for the plant to be disassembled and sent by a big barge to Mozambique where it was landed onto the beach in a primitive area. A loading jetty was put in and the whole operation worked as planned. The project was conceived and owned by a small company called Kenmare. I had some experience in mineral sands and helped where I could.

When Don left Multiplex, he worked on an iron ore project in Cameroon proposing a 450km long railway and a new port. In a great tragedy, a small plane crashed in the jungle carrying Don and most of the company's directors to their death. Apparently, it was due to pilot error alone. From that point, there was just Geoffrey, Susan and seven grandchildren plus me. Julie had died through Parkinson's in 2003.

Limestone Mine and Port at Exmouth

Over the years, Don and I had worked on and off trying to get a metallurgical limestone mine going just south of Exmouth Township. We thought we had a market with Cockburn Cement and Alcoa making lime for their alumina extraction plants in the south-west of WA. However, they opted to continue using low-grade sands from Cockburn Sound. It then became apparent that considerable quantities of large hard stone could be used in local breakwaters and for covering undersea gas pipelines, all of which needed a loading groyne which our partners Adelaide Brighton would never agree to do without contracts, nor would they sell out of the port or let in any potential competitors.

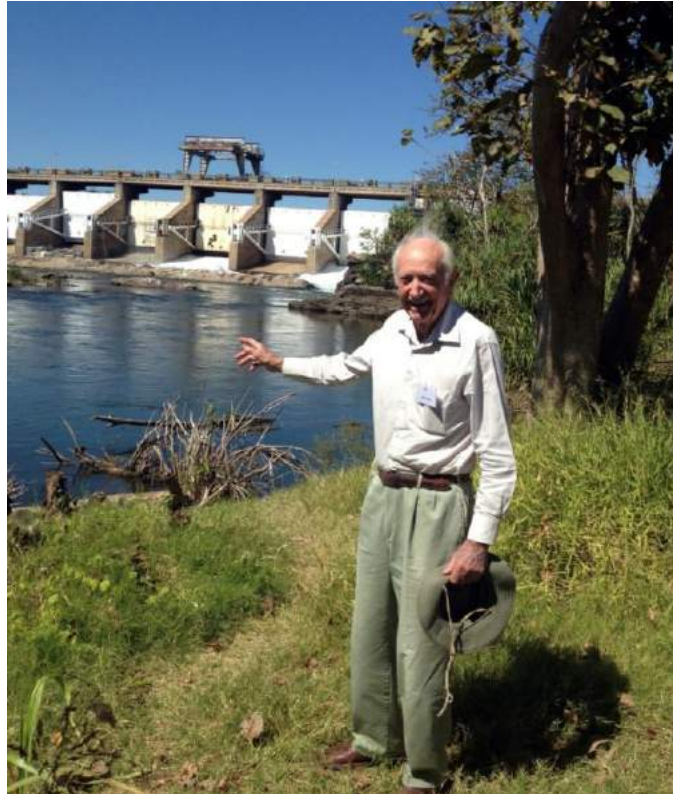
In more recent times, it has emerged that this site in Exmouth Gulf is well suited to be set up as a Supply Base to serve the oil and gas industry north and west of Exmouth. This would in fact be far more lucrative than the original intention. Therefore, I hope this groyne and loading facility will finally be built as a kind of memorial to Don for one thing.

50th Anniversary of Opening of Ord Diversion Dam

On July 20th 2013, the Heritage Award of the Institute of Engineers and the Water Corporation celebrated this anniversary. Around 70 people attended this ceremony among them being Susan, Lindsay, Joel and Tom Medallia, Geoffrey and my sister Ann Hammond. A plaque was unveiled commemorating the event and the engineers both design, construction and contractors who contributed to the original construction.

I was the only senior engineer left from the PWD but several more junior ones from both the PWD and Contractor were there. The actual structure of the Diversion Dam and its channel system remain as good as the day they were built.

The Pumping Station is no longer needed since the Main Dam was built and has been converted into a restaurant sitting on the waters of the Diversion Dam (Carlton Reach).



Family 1980 Onwards

In 1982, Susan married Lindsay Medallia at a civil service in the sunken garden at UWA and a reception at the Matilda Restaurant. They went to live at 34 Williams Rd. Nedlands on a corner house which they renovated very extensively and then added a large extension and garage. When they sold this house in around 1995, they went to 14 Hillway also in Nedlands. This had a pool and extensive garden and not far from the river. This house was sold in 2012 and they now live in an apartment near the beach at North Cottesloe. Susan had spent a year in London in 1976. They have two children Joel and Tom being my first grandchildren out of 7 eventually.

In 1987 Geoffrey married Karen Reece and lived at a house, he had renovated at 1 The Boulevard, Mt. Hawthorn. Geoff had qualified as a structural draftsman and then completed a degree in Town Planning. After a few years working for a private company, he went out practicing on his own. Geoff and Karen had three children, Ben, Tim, and Millie and then moved to a house at 75 Kirkdale Avenue. Floreat not far from where he grew up.

In 1992, Don married Shelley. They lived in Claremont, Gwelup and 2 places in Floreat also very close to where Don had grown up. He had worked for John Hollands, Maunsells, and Multiplex apart from having two years at Berkeley (California) on a Gledden Fellowship. Don and Shelley had two children Georgia and Jackson making up the 7 grandchildren. In a terrible plane accident in Africa, Don (and others) were killed in 2010, which devastated us all. He was at the peak of his career.

Julie had died of Parkinson's in 2003. She was 77.

Trips overseas in later years

A Trip to Nepal.

In around 1985 at age 60, I went with Julie and five others from Perth to remote areas northeast of Kathmandu. We did not want to be swamped by other Europeans so we asked our guides to go into wild areas, which they did. The seven of us started out with 27 Sherpas who gradually went back as we used up our food. There were practically no maps and certainly no GPS or radio. We stuck to the ridges as far as we could so we could see where we were going. On one day, we went up vertically 5,000 feet (1500m) which we had never dreamt of doing before. On the way they tell you; slowly, slowly, one small step at a time, don't stop, don't rush, don't look up, look back as much as you want.

Above 10,000 feet, there are no villages except a few Gompas and the vegetation thins out. The highest I got too was around 15,000 feet on a day trip. There was no rope work involved and no permanent ice. Lower down there were forests of pure rhododendrons in some places, all very large up to 10 metres high. On one campsite on a ridge, in the morning you could see the outfall of at least a dozen glaciers around us and not that far away. This was something none of us had ever witnessed before of course. It is hard to get a photo to do justice to this sort of scenery. Occasionally we had to cross a river by Swing Bridge, which is quite an experience mostly with many planks missing. Using a long stick is a big help in stony ground no matter how fit you might be. I brought mine back and still have it.

A couple of years later we went on a similar trip to Kashmir (Srinagar). This was also very good but they are all Muslims and used horses to carry the gear. Generally, it was not as impressive as Nepal but still an outstanding experience.

A Trip to Egypt

I went alone in around 1988 to pursue my interest in antiquity, history, buildings, and sculptures. I worked my way up the corner of the great pyramid because I wanted to see how the block work was done. You are not supposed to do this but they could not be bothered chasing me despite a lot of shouting. I took good photos and tried to work out how they had placed the blocks using the same technique and equipment as I was given for erecting the concrete plant at Mundaring Weir as a cadet. I have written bits of this up and to my knowledge, there is no good explanation apart from rolling and dragging the stones up an earthen ramp, which was removed afterwards. The blocks are around 1.0 to 1.5 metres high so you can't just walk up and down. You have to swivel on every block and be very keen to do it.

When I got down all the police had gone away but my taxi driver was still there because I had arranged to pay him at the end of the day. It was he who led me to the site of a large Nile River sailing ship that had been recently reconstructed from an undiscovered burial site at the foot of the pyramid. This had had been covered by very large flat limestone blocks too heavy to easily remove. Thanks to my driver, I met a man who had spent the last 30 years of his life on this work and knew every inch of it.

The ship was around 4,500 years old and very well preserved in that dry climate. It was around 60m long from memory, and made of large cedar planks from Lebanon. All the rope work, sails, and oars were re-established. There were examples of clothing, sandals and cooking gear as well as seeds some of which I was told proved to be still viable. This was a great start to my trip.

I stayed in the old part of the El Gazira Palace, which was opened in 1871 for a performance of Aida to mark the completion of construction of the Suez Canal by de Lesseps, but the canal was a year late. The hotel was superb for what I wanted, it was close to the river, and the food and service were excellent.

From Cairo, I flew down to Luxor and saw all the famous temples in that area including Karnak where operas are held with wealthy patrons flying out from Europe for performances. Of course, I went to the Valley of the Kings and Queens. Tutankhamen's tomb had only one small doorway, and when I got to it, there were hordes of people waiting. I was so disappointed as I had looked forward to it so much. However, I found an attendant to whom I told my story and gave him a pound or two, for which he stopped the whole queue and let me, have a minute on my own in the main tomb. This was a hair-raising experience and many thanks to that man.

From Luxor, I went as most do on a river trip up to Aswan. There were mostly French and Spanish on my boat with just a few English speakers. I used to enjoy sitting on my bunk after lunch just watching the Nile go by and its ever changing banks. We stopped at many famous places such as Thebes, Esna, Edfu, and Kom Ombo all very interesting to me, and emerged after 3 days at Aswan where there was an old barrage built by British engineers and raised on one occasion. But now however it had been superseded by the enormous new dam storing the flow of the Nile for the first time and controlling flooding downstream. This all had missed blessings because the annual flooding was very beneficial to the irrigation areas along the riverbanks, which now needed fertiliser, that had to be made using a lot of the hydropower generated by the dam for other purposes. American, European, and Russian experts had been employed using United Nations funding without really coming to grips with this problem. So even late in life I learnt another lesson.

From Aswan, I flew a short way down to Abu Simbel where some very large statues had been moved from where they were going to be flooded up on to a nearby hill slope. It was a great technical achievement.

The Aswan granite quarries had produced great stone obelisks up to 200 tonnes in one piece by just chipping away with primitive tools, and sometimes watering dry peas compressed in to channels in the rock to produce large expansive forces, which split the rock. Moving such large weights with ropes, pulleys, rollers, and grease was another problem in itself. Then they had to get these obelisks on to barges and then off again.

Finally, they had to be stood up. In common with large columns in the temples, it appears that some were dragged on to a sand island, which was then partially excavated to let the foot of the obelisk gradually subside in to place. Many columns were made in horizontal rings, which did not use the sand island method because the pieces were much smaller and lighter to handle.

A Trip to Southern India

In around 1994 I went with Julie on a trip to Tamil Nadu, Karnataka, and Kerala, in particular Madras, Vellore, Bangalore, Mysore, Cochin, Coimbatore and Ooty and southern Indian temples such as Madurai. Julie was finished a book about Mary Martin an Australian who spent a lot of time in this part of India mostly as an upmarket bookseller in Ooty and Coimbatore. We went by train and bus on routes Mary Martin would have used. It was so interesting talking to Indian people in this way. Getting a ticket in the long queues to the computerised system was the hard part. Once you were in the system it worked well.

For me the main interest was in the great Hindu temples each with around 1,000 intricately carved granite columns. They were usually in the form of a large square in which elephants would parade on ceremonial occasions. The temple would be inside a large compound with a wall all around it and very ornate gates on each of the four sides.

In the earlier trip to other parts of India in 1960, Dave Bryden and I had visited the Taj Mahal (Muslim), the Golden Temple at Amritsar and a number of the hundreds of Hindu Temples in the open fields in Orissa. The enormous differences were very interesting even to me.

My Health Issues

In 1997 I had a warning of heart pains in my neck and after a month to have a think about it I decided to have bypass surgery which was a long operation and a very interesting experience but they let me out of hospital after 6 days when I could climb a set of steps unaided. This has proved to be a most successful operation but I could never see what I had been doing wrong – not overweight, good diet, non-smoker, no diabetes, blood pressure OK etc. Nevertheless I have taken anti-cholesterol tablets and aspirin ever since.

In 2011, I had surgery for bowel cancer at Joondalup, which also proved very successful. In 2018, I had a blockage by an enlarged prostate removed. The heart surgery has been checked several times and bypasses are okay.

Julie and Parkinson's disease

Julie was diagnosed with a particularly virulent version of Parkinson's disease in 1995. She had been very busy with her books of which she wrote eight. Within a few years, she was needing care at home several times a day and then increasingly needing hospital care. She had been on no end of drugs apart from 'dopamine' and finally passed away in 2003 after eight years. Her mind was still functioning but not much else and a tube was feeding her. She was 77 so it was a fair innings in which she did more than her share in teaching, family life, community, and writing.

Julie and her many writing friends were nearly all 'greenies' who didn't really like me building dams, jetties and railways. They were dead against the Hillarys Boat Harbour and Northbridge Tunnel for example, but generally once things had been built their objections faded away.

Trip to Rome

Not long after heart surgery, I took another trip on my own to Rome to see all the things I had seen and enjoyed before as this could be my last time (age 72). I went to the bridges, Ostia, Colosseum, Pantheon, St Peters, Forum, Spanish Steps, Trevi Fountain, Piazza Navona etc. watching my progress on the many steps. I stayed at an apartment near the Spanish Steps. On my return, Don picked me up and drove me through the newly opened Graham Farmer Tunnel. Julie stayed at Quinns and was two years into the Parkinson's disease.

Naturalist's Club Trip to the Kimberley's 2001

In 2001, I joined in a bus trip to the Kimberley's. It took 4 days up and 4 days back at about 800kilometre's /day. Also taking part were the Wildflower Group, Bird Club and Kimberley Society so it was broad ranging. It was very well organised by Kevin Coate who later was awarded for his work in tourism. On the way up, we stopped overnight just north of Meekatharra, Indee near Port Hedland, Willare Bridge and finally at Dunham River (Arthur's Creek, Kingston Rest). This was a good bus trip with only one driver (Berkeley). We stopped at many interesting spots on the way up. On the way back we came around the coast and stopped at Willare Bridge again, Whim Creek and Lyons River.

At Kingston Rest was the dam we had built years ago on Arthur's Creek and the irrigation area which was now a paradise for birds. We went to see two Aboriginal communities and saw their artwork. We went over everything at Kununurra, which was good because I had not been there for 10 years. We went for a boat trip up the lake behind the Diversion Dam. This is truly a great boat trip with all the mountains of the Carr Boyd Ranges so close. This is where the early engineers went with horses looking for damsites of which there were several to choose from. Birdlife and vegetation along the river have flourished with the river now running permanently. Saltwater crocodiles don't go above the Diversion Dam or if they do, they are caught and returned downstream.

We also went to the Keep River National Park not far east of Kununurra and saw at some fascinating rock art. There was an Aboriginal 'hide' made of stones for catching hawks and eagles on the roof.

There was a little quarry in hard mudstone nearby and here I found a Cambrian fossil trilobite 450 million years old and the first found in Australia up to that time although there are plenty in Europe and Canada.

A Trip to Turkey

In around 2005, I went on a trip to south-western Turkey with Margaret who had been to Turkey before. She went first and did a trek on the 'Lycian Way' before I arrived two weeks later to meet up at Antalya. This was an ideal area for studying Greco/Roman antiquities in several of their city-states. East of Antalya three good examples with forum, aqueducts, theatres, baths, and harbours; Side, Aspendos, Perge. West of Antalya and all the way up to Ismer there are other great examples culminating in the well-known case of Ephesus where a German builder had reconstructed the famous library. I wrote up personal notes of about 15 typed pages on these dealings with how the city-state worked.

On this trip, we spent a few days in Istanbul, which is a great place for activity, buildings, history, and bridges. We have been there again some years ago joining a train trip through Eastern Europe including Budapest, Warsaw and Krakow. On both occasions, we went to the Blue Mosque and Agia Sophia. Most recently, we went to Pergamum, which was a very extensive site on a large hill where it appeared the aqueduct came in only half way up. There were some splendid remains but one temple had been removed by the Germans piece by piece and re-erected in a museum in Berlin in all its former glory with all the missing pieces replaced. We made sure we saw this exhibit in Berlin, which was very popular. There were also Babylonian and Mesopotamian relics in this museum, which I enjoyed seeing.

A Trip to Sicily

In around 2010, we went to Sicily via Naples. We hired a car, which worked out okay, but you had to lock it up at night. We saw all the various Greek temples in fairly good repair. They were made of local sandy limestone, which was not nearly as good as the marble used in most other places. Sicily of course is the home of the mafia and it shows a bit. Syracuse was a highlight and Palermo not so good in my view. The volcano at Mt Etna had been pouring out lava not too long before we got there.

Dad's memoirs finish here. I think he found it difficult completing his life story beyond the time of Don's death in June 2010.

He continued on his many trips to outback Western Australia, including the Kimberleys where he was greatly interested in aboriginal rock art and paintings. His love of nature, plants and wildlife continued throughout his later life as did his fascination in the antiquities, history and engineering structures.

Whilst he remained mentally as sharp as 96 he was in his early years, a fall on a trip to Broome in mid - 2020 resulted in a broken hip, which curtailed him physically. In October 2020 he moved to Kooy-I-Noor Aged Persons accommodation in Wembley. The care was excellent and dad was quite content there and enjoyed the outdoor garden spaces. He passed away peacefully and unexpectedly on January 8th 2022.

His was a life well lived.

TIDAL POWER IDEA GRIPPED

By PHILIP BODEKER

THE mill-race and paddle wheel was one of man's first attempts to harness nature's energy to his own needs.

Today with the same system, a little more scientifically applied, WA could provide 50 times the electric power that Australia now uses.

Yesterday brilliant young Public Works Department engineer John G. Lewis presented a paper summarising the North-West's tidal power potential.

It was possibly the boldest and most revealing report of its kind ever made in WA. It was also a landmark in the dream of 37-year-old Lewis.

As a student at WA University, he read books by WA authors on the power potential of WA's tidal north. The idea of harnessing this power has dominated his thoughts since.

TODAY, after much research, he estimates:

- ◆ The Kimberley coastline has a tidal power potential of 300,000 megawatts. Australia's total usage now is 6000.

- ◆ The most suitable site for WA's purposes (though by no means the biggest) is at Secure Bay, 70 miles north-east of Derby.

- ◆ The station would cost more than £200,000,000 to build.

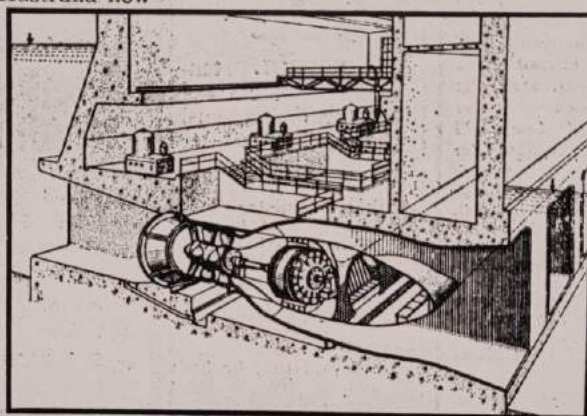
- ◆ It would produce about 2000 megawatts. (The Snowy River irrigation and power project produces 2500 megawatts and cost £450,000,000.)

- ◆ There are 25 possible sites

ENGINEER AS STUDENT



Engineer Lewis



◆ THE MODERN version of the mill-race and paddle wheel—the hydro-electric turbine generator. Water at up to 30 m.p.h. turns the blades of the turbine, generating 9000 kilowatts per unit. The turbines work in side-by-side series employing both the ebb and the flow of the tide.

at which to harness the power of Kimberley tides.

TODAY Lewis stressed that his report was only to draw notice to potential, not to propose any plan.

But to prepare the paper he had worked largely in his spare time—through weekends, late into the night—working out mazes of figures and dozens of cross-checking diagrams and scale maps. Other PWD experts helped

him on technical problems.

A trip to France and Russia last year spurred on the work. Lewis, a Perth Modern School student, WA engineering graduate and Gladden Fellowship winner, studied soil mechanics at the Imperial College in London for two years.

Last year he was sent to Rome to represent the PWD at a world conference on big dams.

This was followed by the In-

ternational Conference on Soil Mechanics in Paris, where Lewis closely studied scale models of the La Ronce tidal power scheme in Brittany.

Then he was chosen to represent Australia at a meeting of the National Irrigation Commission in Moscow.

Russia has the world's second tidal power scheme on the White Sea coast. Though he could not visit it, Lewis made exhaustive inquiries into the scheme.

BACK in Perth, he began his report.

Though he had flown over the Kimberley coast many times before, he made a concentrated reconnaissance of it. Charter aircraft circled over huge tidal gulfs, while Lewis' camera took hundreds of colour slides.

Outside Government circles, the first to hear Lewis' report was the Perth division of the Institute of Engineers last night.

Last year three French engineers in WA hailed Kimberley tidal power potential as one of the biggest in the world. WA engineers are now thinking of it in those terms, too.

Ap. 4th 1963

Big Electrical Potential Seen For Kimberleys

The Kimberley coast has the potential by harnessing its tides to provide five times as much electrical power as is now generated throughout Australia.

Public Works Department design engineer Mr J. G. Lewis told this to a meeting of the Perth division of the Institution of Engineers last night.

In a report summarising the tidal power resources of the North-West coast from La Grange Bay to Darwin, he said 25 possible sites had been chosen which could prove economically attractive on detailed analysis.

The Kimberley resources totalled about 300,000 megawatts compared with Australia's present installed power of about 6,000 megawatts. The report aimed to focus attention on a big and virtually unknown national asset awaiting development by modern scientific and engineering methods. This could be the key to development of the overall resources of the western half of north Australia, and could play a big part in national development.

Spectacular

The best of the Kimberley proposals were spectacular by world standards and probably formed the biggest block of hydro-electric power in South-East Asia.

A comparison with similar

1,000,000 and could only be established on a national basis. It was possible for a small local 100-megawatt scheme to serve a mineral extraction industry. Small sites were numerous around existing iron deposits at Cockatoo and Koolan Islands.

The cost of such a scheme could be £10,000,000 or less at a good site—within the scope of a private company. The total increase in W.A.'s power consumption within the next 20 years would probably be enough to make one of the smallest proposals interesting. It seemed that a 2,000-megawatt scheme would justify the 1,200 miles of high-tension line involved.

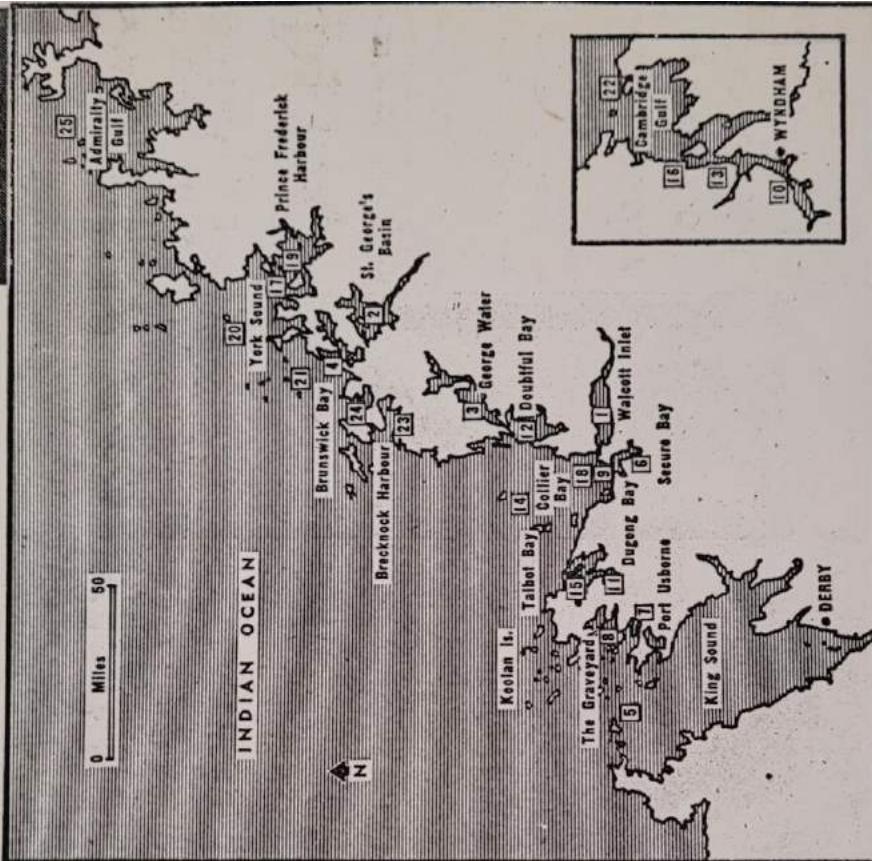
The knowledge of tides on the Kimberley coast was sparse but it was known that spring tides reached 36ft. over extensive areas and probably reached 40ft. or more in places.

The advantage of tidal energy was that it was derived from gravitation forces that varied according to known laws and could be predicted with great certainty.

Tidal power was almost independent of climatic factors, which were the bane of normal hydro-electric schemes, but construction problems were immense.

The priority rating of the

Possible Sites



Possible sites for tidal power development in the Kimberleys are shown on this map, with Cambridge Gulf shown in the inset. The sites are numbered in order of possible economic priority.

SCIENCE AND INDUSTRY

Engineer's Bold Plan To Harness Tides

A survey to begin in the north-west of Western Australia in the next few months could have far-reaching results for the State and even the whole of Australia.

THE French research organisation, Technique, working with W.A. State Public Works Department officers, will examine potential tidal power sites in the Collier Bay area.

A report by a Government engineer, Mr. John G. Lewis, has suggested that some of the vast tidal power resources of the north-west could be fed into the W.A. power grid in the south-west of the State, or even into the main Australian grid in the south-eastern corner of the continent.

His proposals, carefully documented, catch the imagination in their scope, but before any firm decisions can be made much more needs to be known about the sparsely populated and remote coast of the Kimberleys.

The survey, planned to start in April, will concentrate on Walcott Inlet and Secure Bay, where the rise and fall of tides is about 36ft.

Preliminary investigations would take about two years and cost £50,000 yet would cover only a small part of the rugged coastline suitable for possible tidal power development.

This gives some idea of the scope of the challenge and the rewards.

Gathering Information

When he announced the survey in December, the Premier, Mr. David Brand, stressed that State Government financing of a multi-million pound tidal power station was out of the question. The survey, he said, was merely an initial step to gather information which could be of immense value in future negotiations with potential power users.

He added that if it could be established that tidal power generation was an economic proposition, big industries could be drawn to the Kimberleys.

On-the-spot mineral processing was one of the possible results.

In his report Mr. Lewis agreed that tidal power could be of great interest to any of the big companies interested in the development of iron ore deposits in the north-west.

He said there were at least 20 sites for comparatively small tidal power stations of about 100,000 kilowatts. Such a station would cost perhaps £10 million, or perhaps less on a good site, and production costs would be less than 1d a unit. (The Snowy Mountains Authority sells peak load power to Victoria and New South Wales for 9.5d per unit, but many conventional thermal power stations have much higher costs than this.)

However, it was not just as a spur to local industry that Mr. Lewis saw the tidal basin on the rugged, dangerous Kimberley coast.

In addition to the above sites which he dismisses with a brief

By A Special Correspondent In Perth

mention, he also discusses 25 sites which could prove economically attractive on a larger scale.

He estimated that Kimberley tidal power resources totalled 300 million kilowatts (or 300,000 megawatts), compared with Western Australia's present installed capacity of 250,000 kilowatts and Australia's total of 6,000,000 kilowatts.

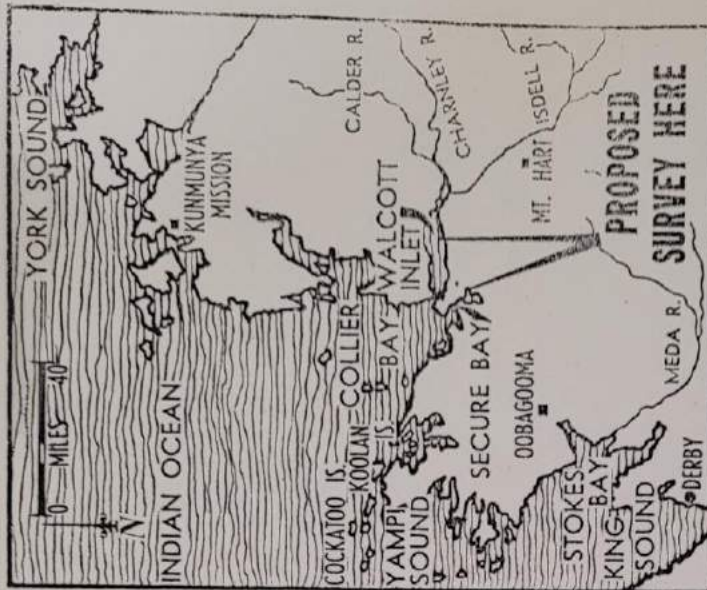
At first glance his proposal that a power line from the Kimberleys could run for 1,800 miles to join up with the south-eastern grid seemed staggering, but he claims tidal power in Russia is being installed to be used in a similar way.

Mr. Lewis said: "On a preliminary cost analysis there seemed to be no particular difficulty in connecting a DC transmission line to the Australian grid."

Reducing The Line Losses

"The line losses and operating costs can be reduced to a surprisingly low value per unit supplied. The calculated costs for two million kilowatts at 50 per cent load factor, transmitted over 1,800 miles, were about 0.10d per unit."

Mr. Lewis added: "Thus the economics and practical possibility of tidal power in the Kim-



• The W.A. State Government next year will survey the areas marked on the map.

costs of the tidal installation itself."

While much more information and research were needed to estimate the costs of such an undertaking, other countries have been sufficiently confident of tidal power's promise to push on with ambitious projects.

One being considered near Murmansk, in Russia, would have a capacity of 8,000 megawatts and another in France 18,000 megawatts.

The French, who are leaders in the field of tidal power, have almost completed a system at the Rance Estuary with a capacity of between 550 and 600

Mr. Lewis pointed out that to be feasible, a tidal power scheme for the Kimberleys would have to cost less than £150 per kilowatt of peak power and would be most attractive at £100 per kilowatt of peak power.

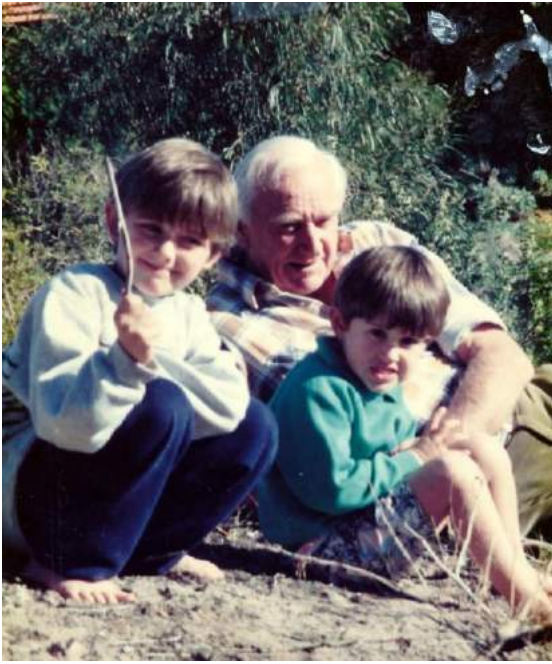
Even at the lower figure, a three million kilowatt system would cost a staggering £300 million.

Mr. Lewis came to the same conclusion as his Premier—such costs were beyond the W.A. Government.

Mr. Lewis suggested in his report that any tidal power scheme would have to be planned by the Federal Government.

Family Photos













Oral History Engineering Projects - Interviewed by Doug Ayre



FW: John Lewis
Engineer.msg

Refer Kununurra Historical Society Website

https://purl.slwa.wa.gov.au/slwa_b4060838_2

